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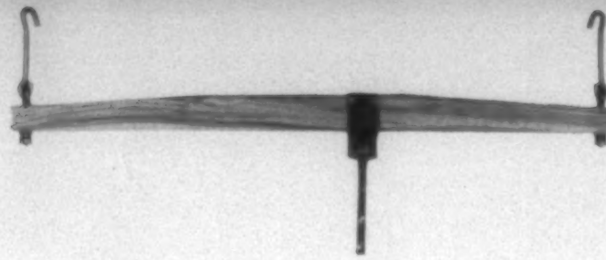
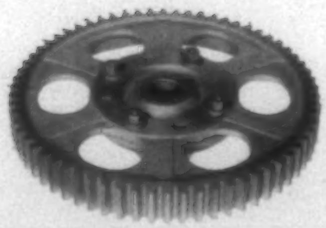
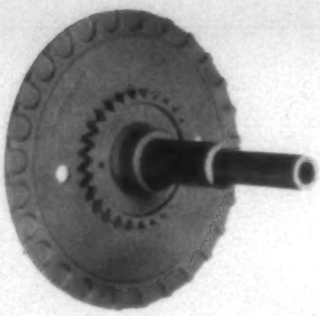
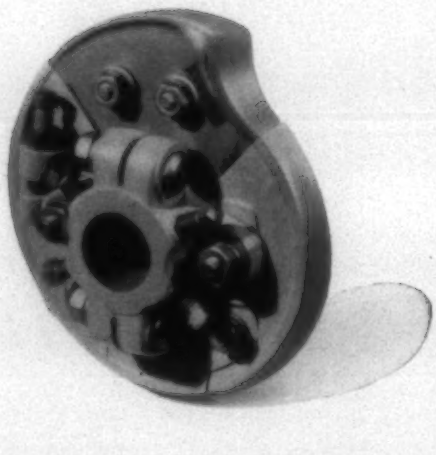
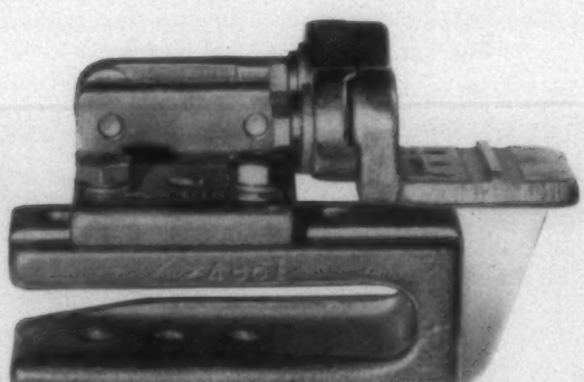
BPA NBP

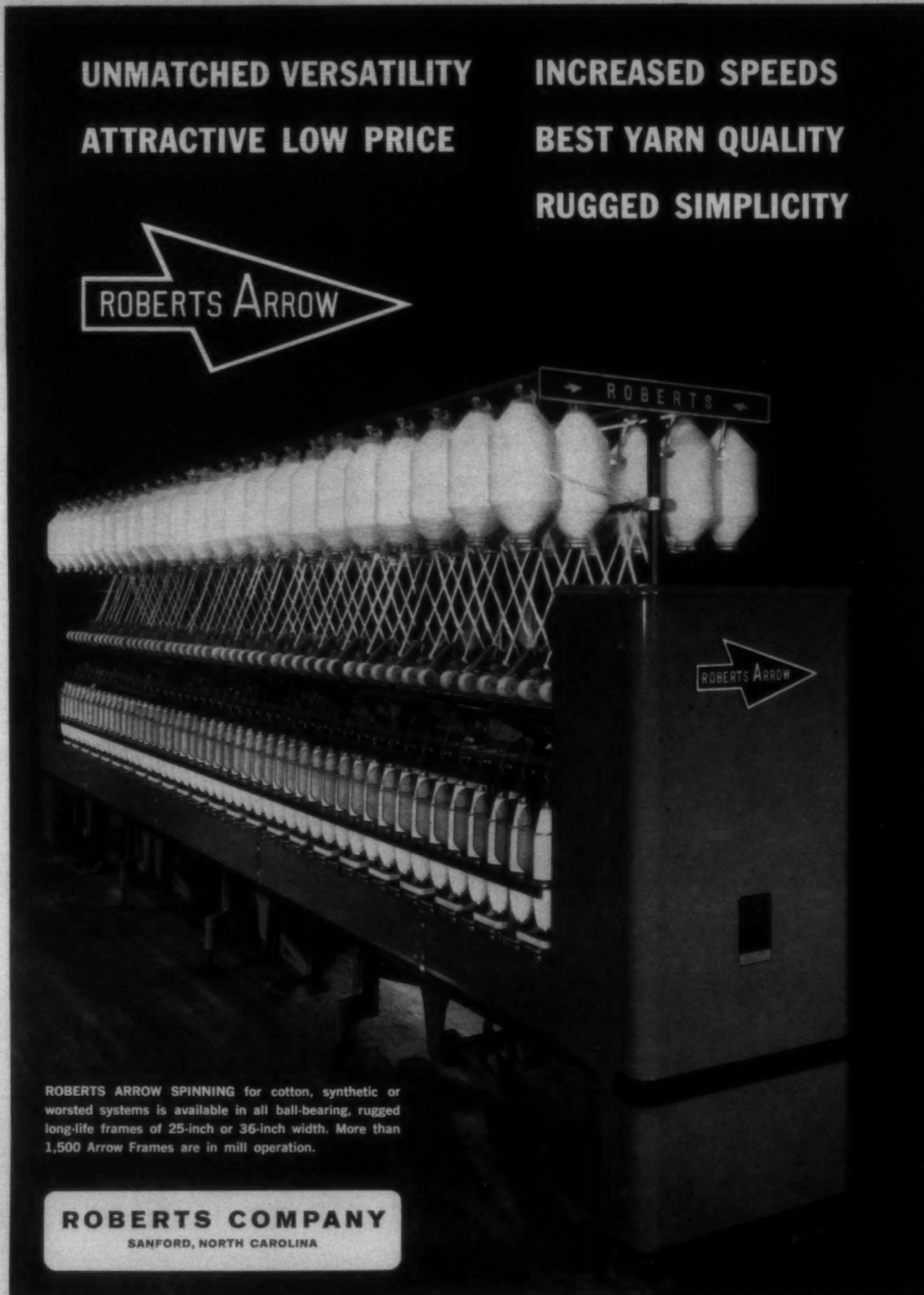











UNMATCHED VERSATILITY
INCREASED SPEEDS
ATTRACTIVE LOW PRICE
BEST YARN QUALITY
RUGGED SIMPLICITY
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ROBERTS ARROW SPINNING for cotton, synthetic or worsted systems is available in all ball-bearing, rugged long-life frames of 25-inch or 36-inch width. More than 1,500 Arrow Frames are in mill operation.
ROBERTS COMPANY
SANFORD, NORTH CAROLINA


ACME
STEEL
NEW!
A SIMPLER, FASTER,
COMPRESSION
STRAPPING
MACHINE

Acme Steel by-passes frills and fancy housings to produce the most compact and efficient compression strapping machine in the textile industry—the all-new F11

Even *four different size boxes* per minute are a pushover—thanks to Acme Steel's exclusive dual-height platen regulators. They're only one of many innovations that make the F11 second to none in high productivity and low operating cost. The F11 is a full-size machine. It handles the *complete* compression strapping cycle through effortless pushbutton control. But:

. . . you won't find a pound of unnecessary, space-stealing housings

. . . you won't find a speck of complex and costly electronic circuits

. . . you won't find a seldom used, tacked-on accessory

. . . you won't find a single maintenance problem that takes a crew and a crane to solve.

Four bolts unfasten the strapping mechanism. This slim, trim unit is so simple *one man* can remove it for service—even replace it with a standby—within five minutes.

Basic F11 design has been proved in dozens of installations. Through pushbutton control, you can convey, compress and strap any size box. You can apply three straps at once . . . as many as twelve per minute.

The machine does the adapting, not you. It can be designed to operate pneumatically or hydraulically. It can be set to compress with the exact amount of pressure you want (up to 10,000 pounds). It can be equipped to feed strap through double-face pallets. It can be ordered for fully-automatic or semi-automatic operation. And the portable control console can be positioned in the most convenient location.

More performance per pound and more dependability per dollar is the reason why 50 textile plants are equipped with Acme Steel compression strapping machines (representing over 90% of *all* machines in use). Have your local Acme Idea Man explain all the fine points of this one. Or, return the coupon to arrange to see the F11 in action on film.

You can compress and strap four boxes a minute (even varying sizes) with up to three straps per box. The portable console lets the operator double-up on jobs—like weighing a completed box while the machine straps the next.

The fully-automatic F11 conveys boxes into the machine on powered rollers. A centering device lines up boxes perfectly. Non-compressible units can be strapped without interrupting production thanks to a platen cut-off.

The semi-automatic F11 compresses the box automatically. An anti-canting mechanism keeps the platen level, even on off-center units. (Powered platen rollers and the box centering device are optional on the semi-automatic model.)

Acme Steel Products Division ACME STEEL COMPANY
Dept. TES-101, 135th Street & Perry Avenue, Chicago 27, Illinois

☐ Please send full-facts folder on the new F11 for the textile industry.

☐ Contact me to arrange for showing of new F11 movie.

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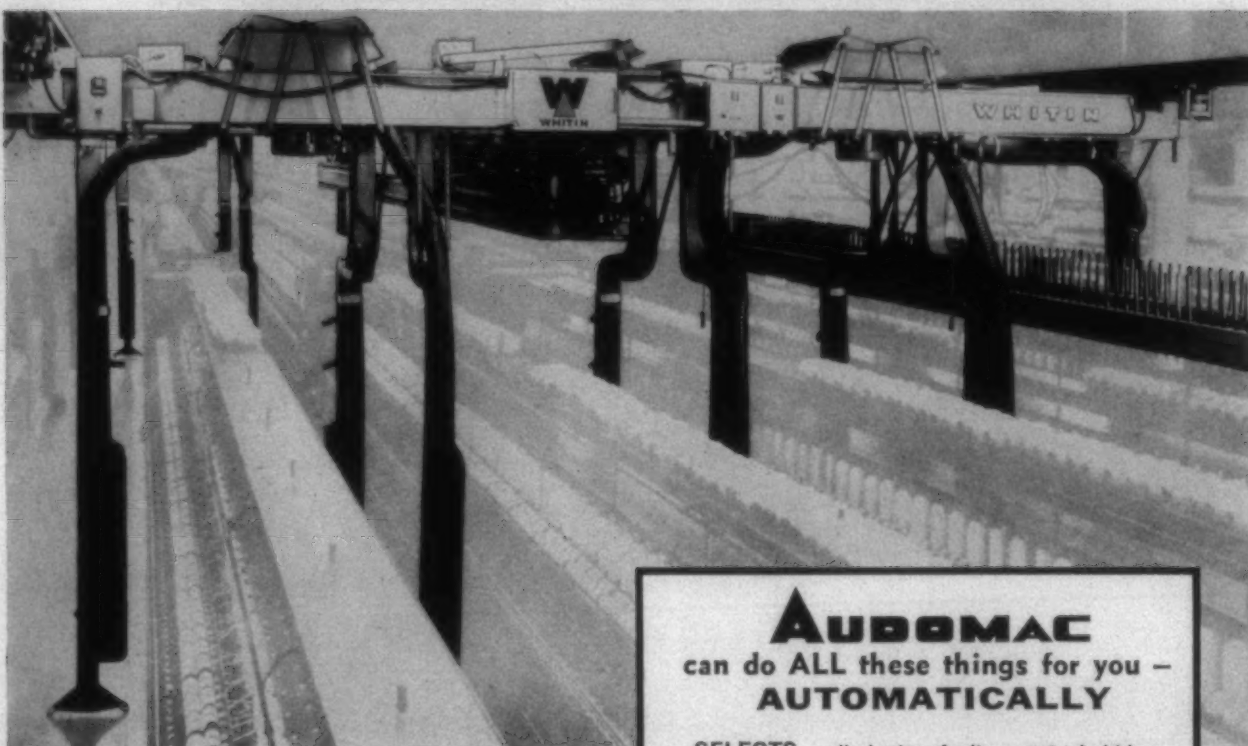
ACME STEEL IDEA LEADER IN **STRAPPING**

W. . . *More* than just a doffer and only WHITIN has it!

AUDOMAC



The AUDOMAC is far more than just an "automatic doffer" — it is a complete bobbin handling system — a system tested through the doffing of over 5,000,000 bobbins in actual mill operation — a system destined to play a major role in shaping the spinning mill practices of the future.

The AUDOMAC Doffer System in months of 144-hour-per-week actual mill operation has dramatically demonstrated its capacity to *increase overall spinning room efficiency by:*

- **Increasing yarn production**
- **Reducing direct labor costs**
- **Providing for improved quality control**
- **Establishing basis for extended materials handling systems**
- **Reducing cost of personnel training**

Call your Whitin representative today about the AUDOMAC . . . only Whitin has it!

(Manufactured and marketed exclusively by Whitin in the United States under license from Deering Milliken Research Corporation.)

AUDOMAC
can do ALL these things for you — AUTOMATICALLY

SELECTS - eliminates faulty empty bobbins

LOADS - frame load of empty bobbins constantly available

TRANSPORTS - bobbins carried, in sequence, at frame signal, to and from spinning frame and to subsequent processes

DOFFS - complete frame of any length doffed in two minutes downtime — 6 to 15 doffs per hour — with less yarn damage

DONS - averages fewer ends down than manual doffing

MONITORS - provides for better quality control by holding bobbin sequence

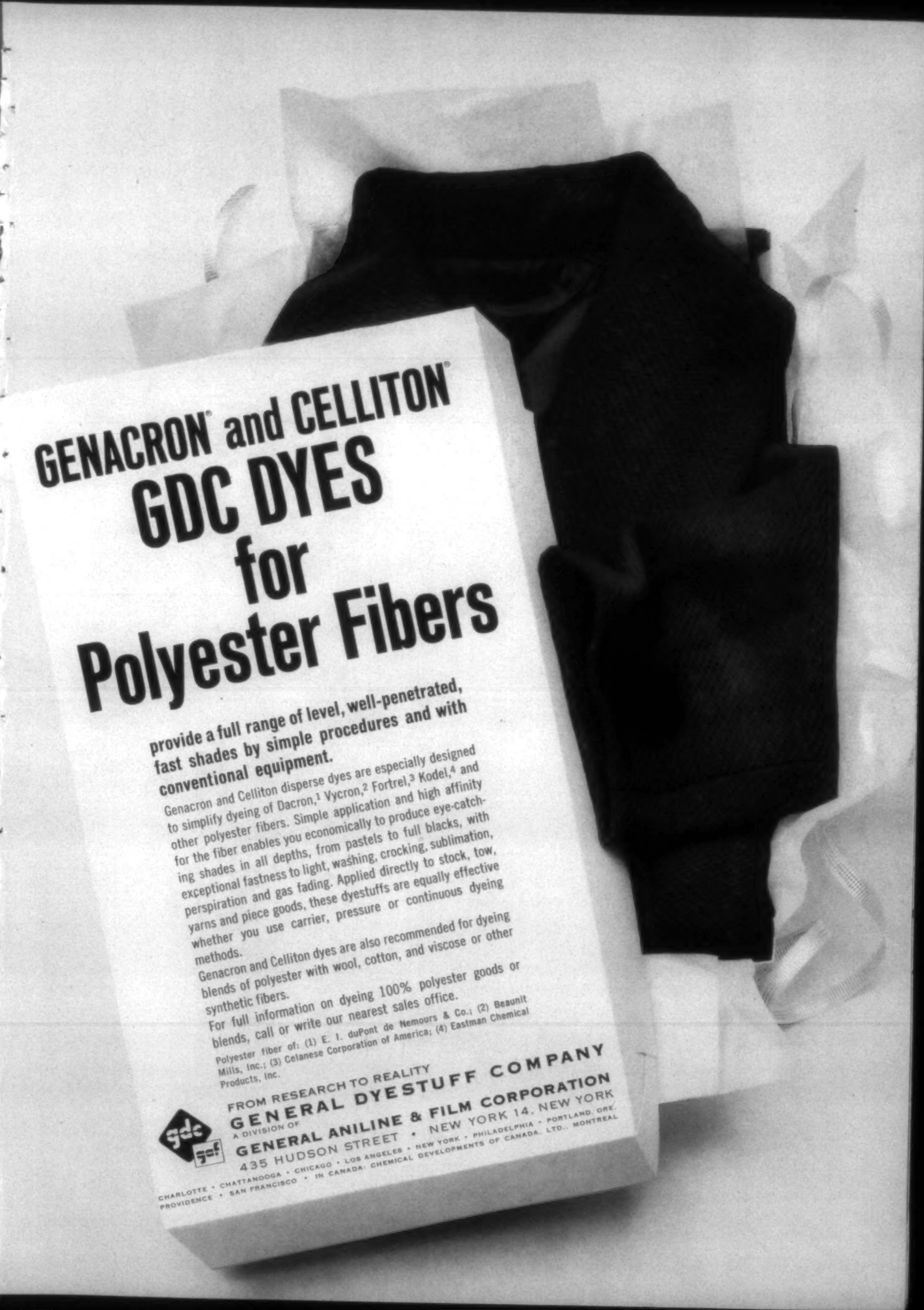
CLEANS - performs superior frame, floor and ceiling cleaning during doffing cycle

WHITIN MACHINE WORKS

WHITINSVILLE • MASSACHUSETTS

CHARLOTTE, N. C. • GREENSBORO, N. C. • ATLANTA, GA. • SPARTANBURG, S. C. • DEXTER, ME.

The best way to better yarns



GENACRON® and CELLITON®
GDC DYES
for
Polyester Fibers
provide a full range of level, well-penetrated, fast shades by simple procedures and with conventional equipment.
Genacron and Celliton disperse dyes are especially designed to simplify dyeing of Dacron,[1] Vycron,[2] Fortrel,[3] Kodel,[4] and other polyester fibers. Simple application and high affinity for the fiber enables you economically to produce eye-catching shades in all depths, from pastels to full blacks, with exceptional fastness to light, washing, crocking, sublimation, perspiration and gas fading. Applied directly to stock, tow, yarns and piece goods, these dyestuffs are equally effective whether you use carrier, pressure or continuous dyeing methods.
Genacron and Celliton dyes are also recommended for dyeing blends of polyester with wool, cotton, and viscose or other synthetic fibers.
For full information on dyeing 100% polyester goods or blends, call or write our nearest sales office.
Polyester fiber of: (1) E. I. duPont de Nemours & Co.; (2) Beaunit Mills, Inc.; (3) Celanese Corporation of America; (4) Eastman Chemical Products, Inc.
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GENERAL DYESTUFF COMPANY
A DIVISION OF
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PROVIDENCE • SAN FRANCISCO • IN CANADA: CHEMICAL DEVELOPMENTS OF CANADA, LTD., MONTREAL

Notice the two laps pictured above. You can't tell any difference between them, can you? They both look exactly alike, and yard by yard, they both weigh the same. Yet, one is a good lap and one is a bad lap. You may not see any difference now but you will in your finished yarn. One inch of bad picker lap will make 650 yards of 30's yarn with excessive count variation.

The simplest and most effective means of controlling yarn size is inch by inch measurement of the picker lap. The Varimeter enables an accurate tracing and subsequent elimination of picker faults. The Varimeter is versatile. It can be mounted on the picker or on an unwinding device located in the picker room or in the laboratory at the option of the mill.

USTER

EVENNESS TESTER • INTEGRATOR • SPECTROGRAPH • IMPERFECTION INDICATOR
VARIMETER • STRENGTH TESTER • SPECTOMATIC • WARP PREPARATION EQUIPMENT

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Canadian Sales Office: Hugh Williams & Company, 77 York Street, Toronto 1, Ontario

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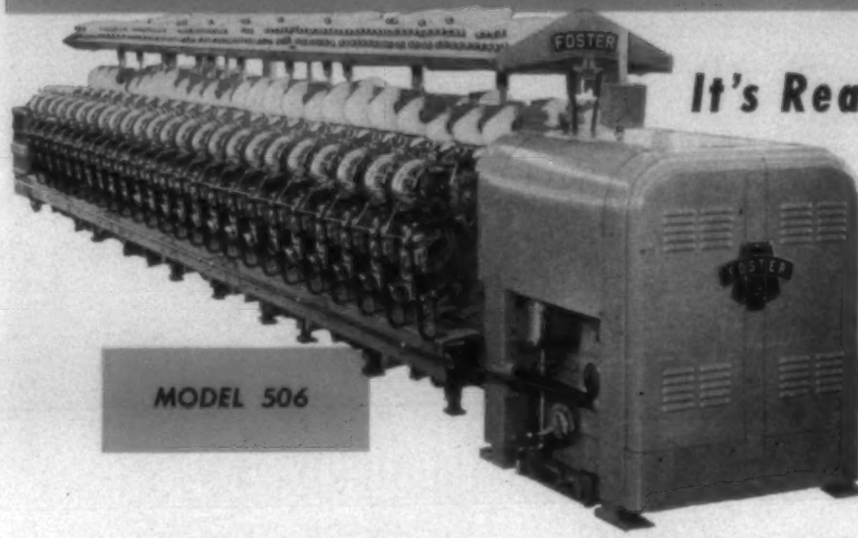
FOSTER MODEL 506 AUTOMATIC WINDING MACHINE



It's Ready! It's Selling!

Additional machines will be shipped, beginning this September, to such progressive mills as A. M. Smyre Manufacturing Company, Ranlo, N. C., The Russell Manufacturing Company, Alexander City, Ala. and Swift Spinning Mills, Inc., Columbus, Ga.

Firestone Synthetic Fibers Co., Hopewell, Va., and E. I. Dupont de Nemours & Co. of Seaford, Md., have also placed orders for the Model 510, another version of the 500 series.

THE FOSTER MODEL 506 BENEFITS YOU IN 8 WAYS:

1. Increases operator productivity by 50%.*
2. Winds at twice the speed of our manual winder.
3. Requires less floor space per pound of yarn produced than our manual winder.
4. Prevents wild yarn (butterflies), tangles, bobbin rings, crossed ends, uneven package density and rough yarn.
5. Electric size stop breaks back yarn, eliminating gauging of package diameter by hand.
6. Produces any type of open wind putup, including a steep taper (9°36') knitting cone up to 14" in diameter.
7. The Model 506 cone is an even better package than the Model 102 cone (standard for the sales yarn market for many years).
8. Investment required is no more than for our manual winders with same capacity and similar features.

**Substantiated and documented in mill tests, under production conditions.*

AUTOMATIC FEATURES

Only those operations which will NOT endanger yarn or package quality have been automated. These include threading up, slubbing and cleaning, disposal of empty bobbins, gauging full cones, donning full bobbins and doffing empty bobbins.

SPEEDING UP MANUAL OPERATIONS

To keep the mill investment required within practical limits and to assure top yarn and package quality (which is so vital to sales yarn spinners), donning and doffing of cones, providing the bobbin supply and knot tying are still done manually. However, providing the bobbin supply and tying knots have been so simplified that altogether they require only fractions of a minute. Wild yarn, tangles, bobbin rings, crossed ends, uneven package density and rough yarn (which are unavoidable at times with automatic knot tying) are definitely prevented.

YOU CAN STILL GET EARLY DELIVERY

We will put 1,000 additional spindles of the Model 506 into production in December for delivery early next year. If you want early delivery, order NOW!

MANUAL OPERATIONS WHICH TAKE ONLY FRACTIONS OF A MINUTE AND PROTECT YARN QUALITY


Dropping bobbin in chute.


Tying knot with standard high speed knotter and testing — all with left hand.


Restarting spindle with right hand.

266-1

FOSTER MACHINE COMPANY

A YARN WINDER FOR EVERY PURPOSE

Westfield, Massachusetts, U. S. A.

Member of American Textile Machinery Association

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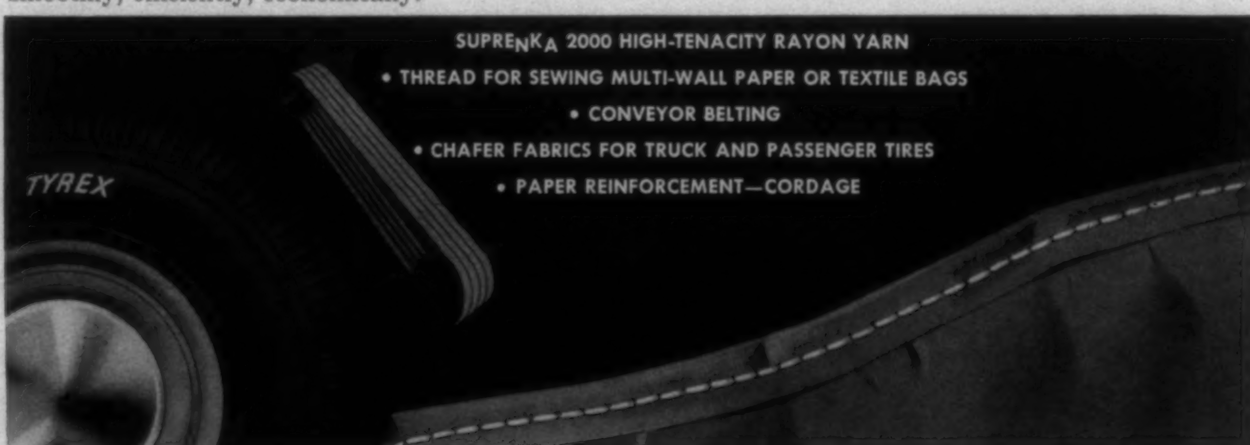
New symbol of yarn power for industry...

SUPRENKA®

No job is too tough for Suprenka, Enka's high-tenacity, low-cost industrial rayon yarns—yarns made stronger to last longer. Name the job, and you'll find a superior Suprenka yarn engineered to handle it smoothly, efficiently, economically.



New! American Enka Launches High Modulus Industrial Yarn Called SUPRENKA® Hi Mod™

This new high-tenacity rayon yarn has been engineered for end-uses where high modulus, negligible wet or thermal shrinkage, and high strength are required.

Suprenka Hi Mod provides excellent stability during processing because of its low shrinkage when heated or moistened, and in use the new yarn has low growth under load.

Contact Industrial Sales Dept., American Enka Corporation, Enka, N. C. MOhawk 7-1311 or 350 Fifth Avenue, New York 1, N. Y. PE 6-2300 or the District Sales Office nearest you.

American ENKA Corporation, Enka, N. C. • Producer of nylon • rayon • yarns • fibers

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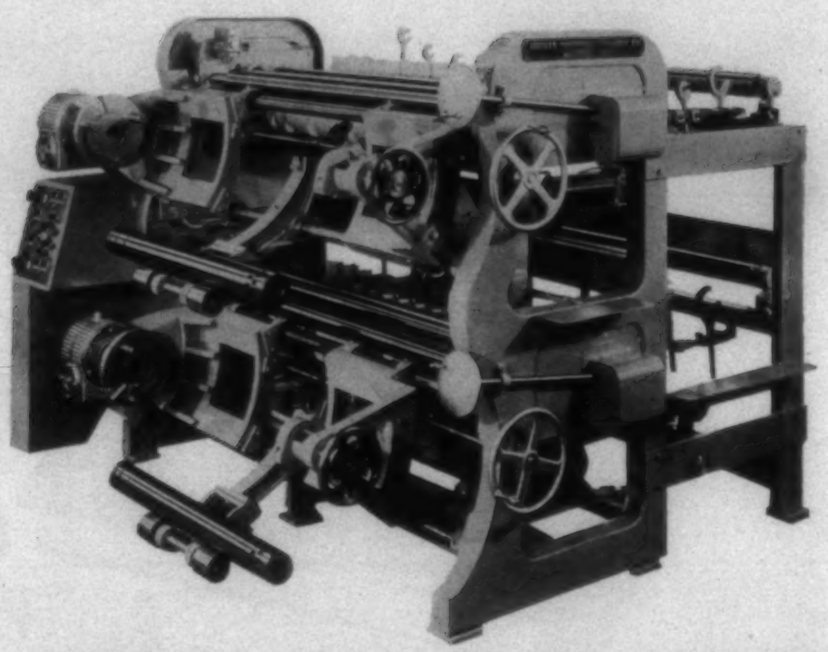
For Light Constructions

The Cocker Double Head Slasher



Produces 2 Loom Beams at One Time

Here are two superb slasher head units on one frame—each completely independent in operation and equipped with all the features which make Cocker Slashers the most efficient in the world.

Each Beam Has Its Own . . .

Incomparable GH & Torque Tube Drive*
Air Lift Calender Roll
Air Operated Compressor Roll
Individual Tension Control
Individual Comb and Comb Adjustment
Individually Adjustable Beam Carriage

This compact and economical double head slasher is available with a large variety of drives. If you slash light constructions it will pay you to get the facts on this two-in-one unit. Write today for full information.

*Patented

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WORLD'S LARGEST DESIGNERS
AND BUILDERS OF COMPLETE
WARP PREPARATORY EQUIPMENT

GREATER STRETCH FOR WARP SIZING (%)

TAKE YOUR PICK

only Chemstrand has 70-denier nylon in 4 filament counts for immediate delivery

Call on Chemstrand for nylon yarn in the specific modulus your stretch programs require. There are 4 filament counts available in 70-denier for immediate delivery.

It's a Chemstrand exclusive planned to give you the opportunity to sell designers and manufacturers of the widest possible variety of stretch fabrics to suit all needs. With the assurance of perfect fit every time.

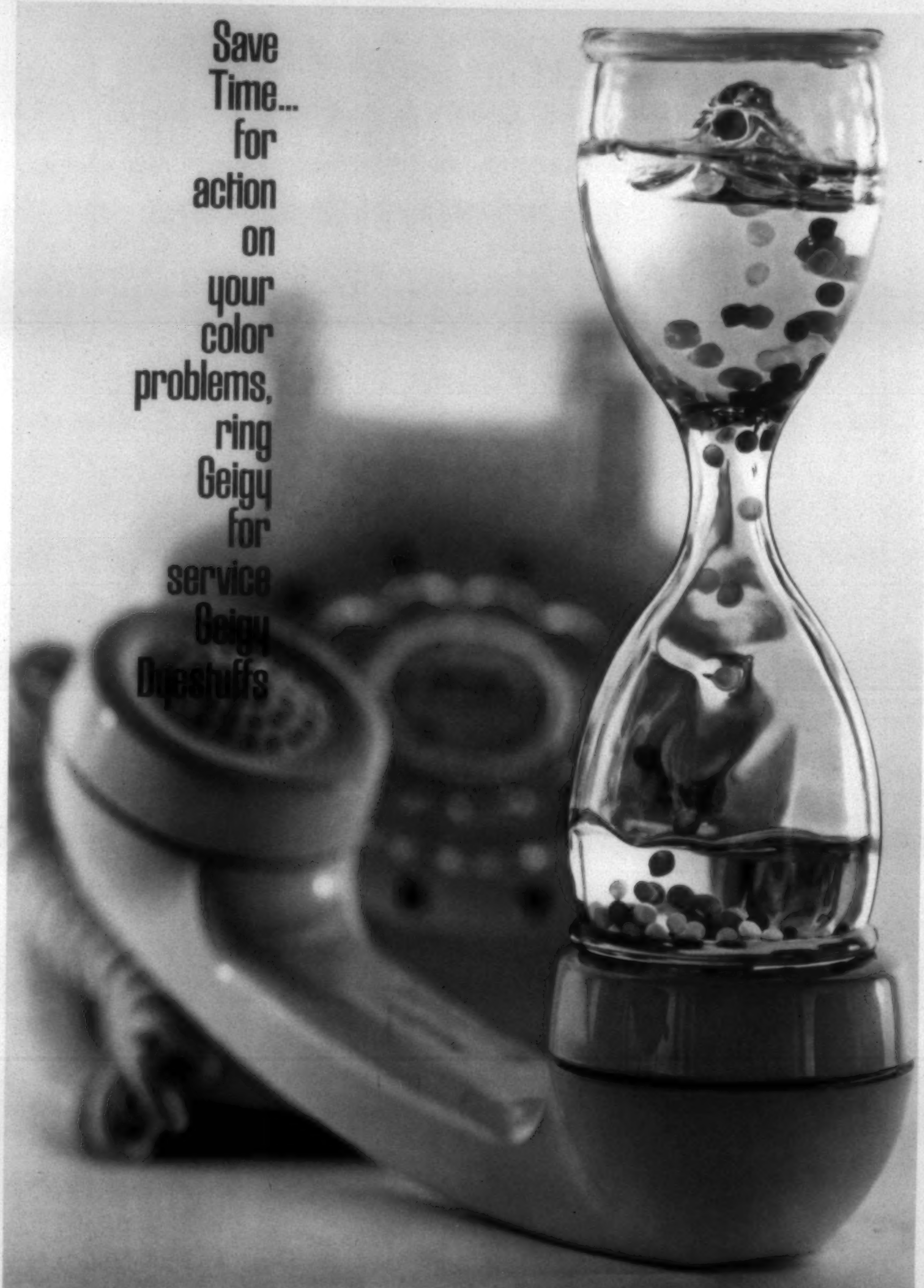
Choose from these four filament counts:

34 filament—low modulus; gentle recovery.
20 filament—intermediate recovery.
17 filament—quicker recovery than above.
13 filament—high modulus; fast bounce-back.

All in 70-denier. Regular or high elongation. And all for immediate delivery. Whatever your needs or problems, consult Chemstrand for expert technical assistance of any kind. Call or write your nearest Chemstrand sales office.

CHEMSTRAND NYLON ®

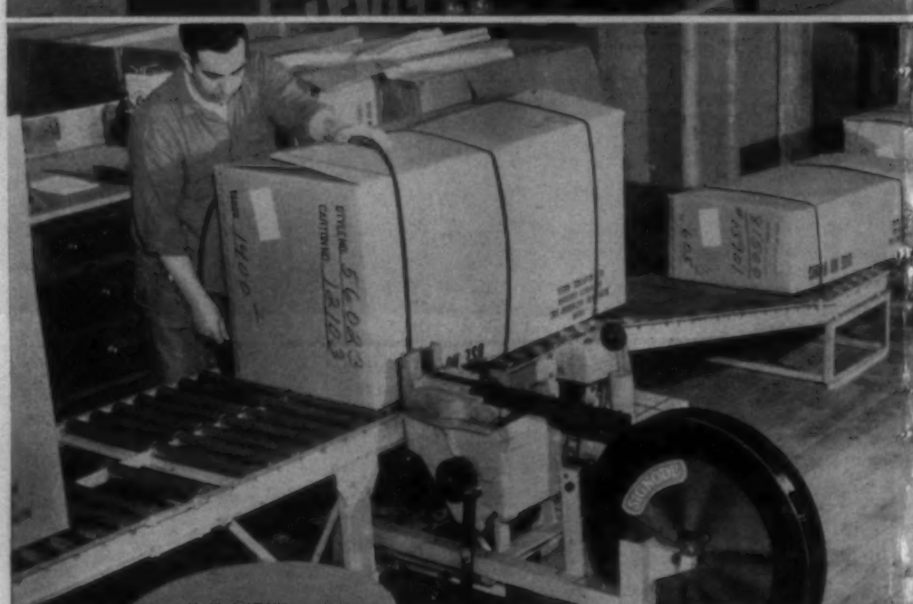
THE CHEMSTRAND CORPORATION • GENERAL SALES OFFICES: 350 FIFTH AVENUE, NEW YORK 1, N. Y. • DISTRICT SALES OFFICES: 350 Fifth Avenue, New York 1; 3½ Overwood Road, Akron, Ohio; 129 West Trade Street, Charlotte, N. C. • Canadian Agency: Fawcett & Co., 34 High Park Blvd., Toronto, Canada • PLANTS: CHEMSTRAND® NYLON — Pensacola, Fla.; ACRILAN® ACRYLIC FIBER — Decatur, Ala.


Save
Time...
for
action
on
your
color
problems,
ring
Geigy
for
service
Geigy
Dyestuffs

Signode Model SFC manually-operated seal feed strapping tool tensions, seals and scores strap at the seal for easy break-off with fast, smooth, one-arm movement. Weighs only 6½ lbs., and its almost perfect balance makes it easy to handle with one hand. In the illustration, the operator is using the SFC in the Signode strap-saver baling method, which reduces strap use by as much as 17%.

Signode Power Strap Feeder is a motorized, foot-pedal operated device for putting strap around big packages. It eliminates the need for a helper, enables one man to strap as many as 500 large cartons per day. Can be used with the Model AP strapping tool shown, or any of Signode's hand, air, or electric powered combination strapping tools.

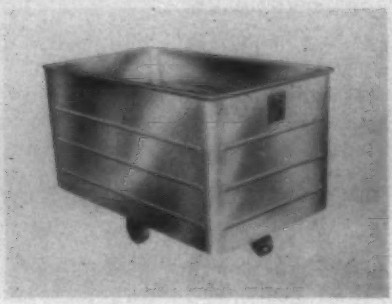
Signode Power Strapping Machine automatically feeds, tensions, seals and severs the strap in seconds. One operator readily applies strapping more than fast enough for the highest production rates. May be used on cartons, bundles, boxes or bales of varying sizes, giving uniform pre-set tension at the touch of a foot pedal. Completely automatic strapping stations also available.



For The Textile Industry's Use

— NEW MACHINERY, EQUIPMENT AND SUPPLIES —

Dyehouse Utility Truck



A new dyehouse box truck designed to give ease of maneuverability and full protection of materials is offered by Klauder Weldon Giles Machine Co., Philadelphia, Pa. Of all stainless steel with reinforced bottom, the standard size measures 32″ wide x 54″ long x 27″ deep. Special sizes are available for special requirements.

(Request Item No. J-1)

Textile Disinfectant

Emkay Chemical Co., Elizabeth, N. J., has introduced a new series of products which it calls Emkasans. The first of this series, QA-50, is a cationic surface active quaternary ammonium compound based on dodecylbenzyl trimethyl ammonium chloride. Its germicidal, algaecidal and disinfectant properties are designed to be effective against most types of bacteria, fungi, algae, etc. It's recommended by the company for many textile and industrial uses.

(Request Item No. J-2)

Doubled Life For Nylon Hanger Type Bearings

Turbo Machine Co., Lansdale, Pa., has doubled the life of a nylon bearing by designing it so the bearing can be reversed after wearing on one side. Machined from a large Polypenco tubular bar, manufactured by The Polymer Corp., Reading, Pa., the bearings are designed to support heavy loads while submerged in hot, acidic dyeing solutions or heated caustic bleach in rotary dyeing machines.

The total load on the bearings consists of the weight of the stainless steel cylinder or drum (up to 1,600 lbs. in the larger machines) and the weight of the load to be dyed, from 4 to 250 lbs. depending on the machine.

The cylinder shaft is supported by two nylon bearings (Fig. 1) submerged in a dyeing solution and resting loosely in the hanger bearing seat. The nylon bearings are restricted from turning in the seat by a nylon pin passing through a hole in the bottom of the hanger bearing. After the bearing has worn beyond allowable limits, it is rotated 180° and placed back in service.

As shown in Fig. 2, bearings are made with clearances that may appear to be exceptionally large to some designers. These are not as detrimental as in metal bearings, according to the company. Too much clearance in a metal bearing can lead to peening and subsequent bearing damage. Resilient plastic bearing materials are designed to absorb impact and resist peening much better than conventional metal bearings.

Nylon bearings have been used both as original equipment and as a replacement item. Originally, phosphor-bronze bearings were used. However, Turbo has found that bearings could be machined from Polypenco nylon tubular bar at a 10% reduction in total cost. In addition to being less expensive, the nylon bearings wear longer than the phosphor-bronze. Bearings are machined in two sizes—3″ ID by 5¼″ OD for smaller machines and 4″ ID by 5¾″ OD for the 100, 200 and 300-lb. capacity rotary dyers.

Nylon does not affect the color of the dye, and shows no effect from the majority of caustic bleaches or the slightly acidic dyeing solution.

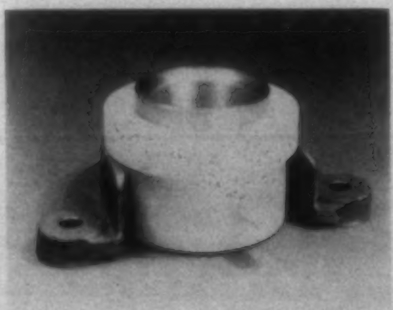


Fig. 1—The reversible nylon bearings are restricted from turning by a nylon pin passing through a hole in the hanger. After the bearing has worn beyond allowable limits, it is rotated 180° and placed back in service.

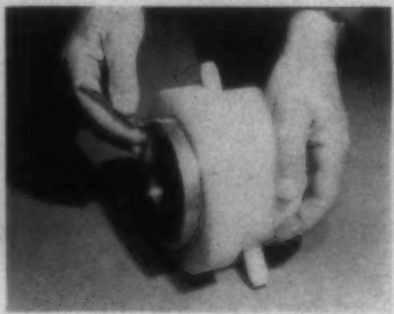


Fig. 2—Large clearances can be used with nylon bearings. Whereas large clearance can lead to peening and other damage in metal bearings, plastic bearing material, Turbo points out, will absorb impacts and resist peening much better.

(Request Item No. J-3)

Thermosetting Resin

A new thermosetting resin, Hylite, has been released by Proctor Chemical Co., Salisbury, N. C. The resin specialty is designed to be an economical crease resistant for wash-wear fabrics which will not adversely affect the light fastness of most classes of dyes, including reactive dyestuffs.

(Request Item No. J-4)

Du Pont Adds Color To Imron Floor Finish

The Du Pont Co. has added color to its Imron textile floor finish widely used by more than 300 Southeastern mills. Called Imron urethane enamel, the pigmented polyurethane coating is available in gray, light green, ivory, yellow and black. Like its clear predecessor, it offers an extremely hard but elastic finish. It can be applied to wood, masonry, concrete and metal with equally good results if surfaces are properly prepared, Du Pont points out. Its high gloss surface prevents accumulation of oil, lint and other foreign matter, and makes the finish easy to clean. Despite its slick appearance, it presents no slipping hazard. It is tack free in 4 to 6 hours after application in a temperature of 70° F./50% r.h. A second coat can

HERR "M" TYPE CONICAL RINGS
WITH AUTOMATIC PRESSURE LUBRICATION

With Herr "M" Type Rings and Controlled Automatic Pressure Lubrication.
"YOU DON'T HAVE TO DEPEND ON THE TRAVELER TO SPREAD THE OIL" says Bob Gard.

Bob Gard, who is overseer of spinning, inspects frames that have been in operation for almost three years.

HERR MANUFACTURING CO., INC.
312 FRANKLIN STREET • BUFFALO 2, N. Y.

For Spinning and Twisting Worsted • Woolen • Rayon • Nylon • Orlon • Fiberglass and Blended Yarns of all Types

be applied after 16 hours under the same conditions. Drying time and period between coats are reduced by especially warm, humid conditions. The finish is applied by either brush or spray, covers 410 to 435 feet per gallon, and forms a film approximately 2 mils thick after drying.

(Request Item No. J-5)

High Strength Starch

A new high film strength starch for warp sizing called HFS Starch, has been introduced by National Starch & Chemical Corp., New York City.

The new starch has been chemically modified to produce tougher starch films with greater strength—up to 30% stronger. Higher efficiency is also attainable with yarns made from low grade fibers due to the superior binding qualities of HFS, National claims.

The new starch is designed to resist viscosity breakdown on continued cooking and to reduce viscosity breakdown due to excessive size circulation, pumping and other mechanical factors.

Films of the new starch absorb 30% less water than pearl starch. This is an important factor to be considered by mills having humidity spray units, where droplets of water occasionally strike the warp or where there are variations in the percent relative humidity.

(Request Item No. J-6)

Ciba Jet Black

A new jet black, Cibanone Black MBA Double Paste, has been introduced by Ciba Co. Inc., Fair Lawn, N. J. It is said to be highly effective in dyeing bloomy black shades on cotton yarns. It may be applied by either the pigment or reduced methods and may also be used for dyeing cotton piece goods or spun rayon by conventional application methods.

(Request Item No. J-7)

Self-Curing Latex Requires Less Thickener

A new, self-curing latex compound for carpet backing, Lotol L-4634-D, which requires approximately half the amount of thickener material used in standard compounds has been developed by the Naugatuck Chemical Division, United States Rubber Co.

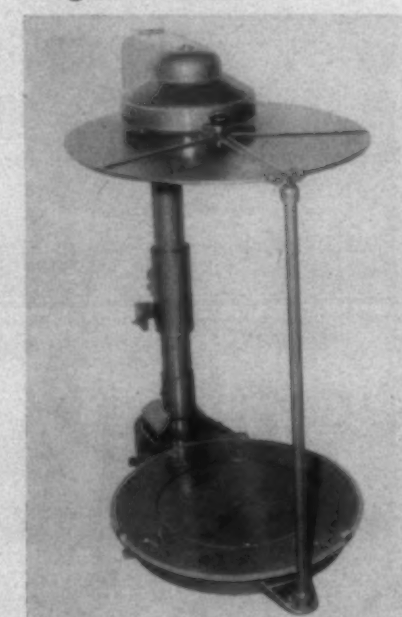
The new compound has good heat and light-ageing characteristics and has excellent low-temperature properties and high filler tolerance, according to the company.

The new material is the second self-curing latex compound developed by Naugatuck Chemical. Principal advantage of the self-curing materials is that they eliminate the need for high-temperature oven curing. The self-curing compounds do not contain the usual sulfur curing agents and accelerator chemicals, which can cause offensive odors and staining, the company reports.

The compound features excellent tuft and pile lock, resilience, hand and resistance to deformation. Fadeometer tests show that it is more resistant to heat and light-ageing than other self-curing compounds now on the market, according to the company.

(Request Item No. J-8)

Large Size Coilers



Southern Sales Equipment Corp., Hampton, Ga., is now marketing complete coilers for cans 30" in diameter and 42" or 48" high. The new coiler line handles a wide range of material from cotton to worsted materials.

The coil produced by the new coilers is an under-center coil. The number of coils per turn of the base can be changed to give maximum sliver weight for a given can without packing. The calender rolls are available in diameters of 2" or 2½" with tube sizes of 1⅛", 1⅜" and 1⅝" I.D. to fit the grain and type of material being run.

An auxiliary support at the front of the coiler assures rigidity of the coiler

without excess weight or bulkiness, the company reports.

One feature of the coiler for handling worsted materials is a replaceable Nylatron ring which supports the tube gear and eliminates the need for oiling.

Southern States' Alley-Skat sliver handling system is designed to permit easy movement of the large diameter can. This system, available at extra cost, consists of a dolly affixed to the bottom of the can and a set of latches affording train-like movement of several cans.

(Request Item No. J-9)

Cold-Water Softeners

Onyx Chemical Corp., Jersey City, N. J., is offering a range of Polasan liquid, cold water soluble softeners and lubricants for the textile industry.

The series is comprised of Polasan A, N and C, denoting the anionic, nonionic and cationic types respectively. The Polasans are characterized by their physical state combined with low-cost, high degree of softening, anti-static effect and compatibility with a wide range of finishing materials such as resins and builders, Onyx points out.

Polasan A and Polasan N have extremely high resistance to discoloration due to high temperature processing. Polasan C is effective in acid fulling as a lubricant and protective agent for wool.

(Request Item No. J-10)

Saw And Splitter For Foam Fabricators

Femco's new Kadet vertical saw is designed specifically for the small foam fabricator and distributor.

Femco, Cuyahoga Falls, Ohio, producer of plastic foam fabricating equipment, has introduced two fabricating machines designed primarily for smaller foam distributors and fabricators.

Known as the Kadet vertical saw and the Kadet horizontal splitter, the two machines are designed to give the small distributor or fabricator the basic equipment he needs for a complete foam fabricating operation. Both can be purchased together for less than $6,000.

The vertical saw will trim and slit blocks or sheets of flexible foams into desired dimensions. It has an 82" wide by 125" long table and a cutting head with a throat clearance of 48". Material to be trimmed or slit is placed on the table which is pushed by the operator into the cutting knife. The cut stock can then be removed or the table may be returned to the start position with the cut stock still in place. The cutting head has a free cutting height of 36" and can be expanded to 42" to accommodate higher foam blocks.

The horizontal splitter will split and level foam blocks into any desired thickness from 1/16" to 14". Stock to be split is placed on the machine's 72" wide by 125" long table and then pushed through the cutting head which is raised and lowered through push-button control. An idler compression roll holds the stock in place during the cut.

A special coating on the guide bar of both the saw and the splitter permits the table of either machine to be returned to

start position without removal of cut material. This makes it possible to fabricate an entire block of foam into sheets without removing any of the sheets until the entire block has been fabricated.

Both machines are of tubular steel and each comes with two blades—a 15-point and a V-tooth. A special snap-on guide bar is furnished with the splitter for splitting thin sheets.

(Request Item No. J-11)

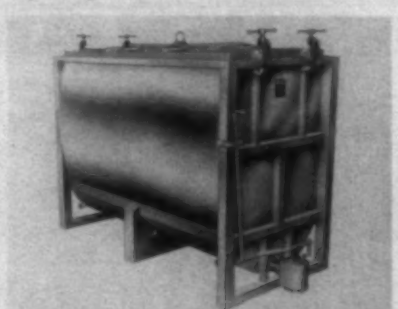
Neutral-Toned Vat Grey

A clear, neutral-toned vat grey of excellent fastness, Cibanone Grey P2R Double Paste, has been developed by Ciba Co., Fair Lawn, N. J.

It is designed to dye grey shades uniformly with little or no shading colors added; for many current grey shades. Other grey shades may be produced by a wide range of shading components. Developed primarily as a yarn dyeing color, it is suitable for application by conventional processes to cotton and rayon piece goods and has excellent build-up properties.

(Request Item No. J-12)

High Bulk Orlon Skein Dyeing Unit Available



High bulk Orlon and other man-made or natural yarns may now be dyed in skein form with improved penetration in the new Duo-Flo machine, a development of Klauder Weldon Giles Machine Co., Philadelphia, Pa. Specially developed for yarns where controlled shrinkage is a factor, the machine is designed to be equally applicable to all types of yarn.

Of all stainless steel construction and new curved tub design, the new unit gives a continuous and automatically reversible dye cycle so that full penetration is guaranteed, according to the company.

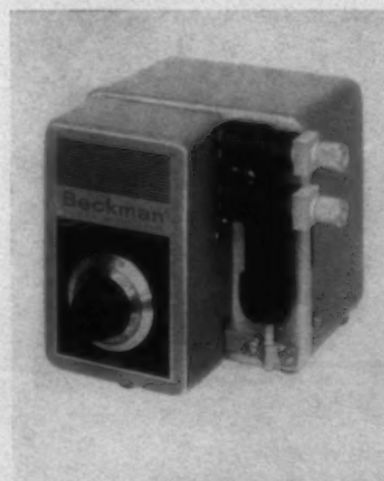
Adjustments to meet skein length and shrinkage requirements may be made quickly and easily. And a new dyestick design prevents stick marks and allows the dye to flow freely through it. Doors slide up and then become self-storing to save space and permit faster and easier loading and unloading.

Capacities range from 200 to 400 lbs. and the unit is available in a choice of models to meet specific dyehouse requirements.

A new yarn carrier truck designed to handle the yarn carriers received from the Duo-Flo machine is also offered. Structural steel construction and oversized wheels provide both strength and minimum wear on floors. Stainless steel members are provided at the point of contact with the yarn carrier.

(Request Item No. J-13)

Solution Metering Pump



A new Solution Metering Pump designed to deliver minute quantities of a variety of liquids is being marketed by Beckman Instruments Inc., Fullerton, Calif.

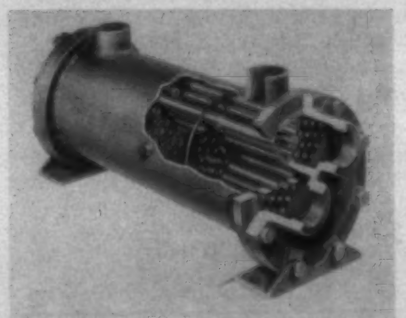
The pump is available in four ranges: 0-2, 0-5, 0-10 or 0-20 milliliters per minute. A turn of a pre-calibrated knob which reads to thousandths of milliliters per minute sets liquid flow with an accuracy of $\pm 2\%$ of the pump's full range. Repeatability is better than $\pm 0.5\%$ of rated capacity. They may be applied where small quantities of fluids must be measured, including organic synthetic research, reaction rate studies or pilot plant operations.

Internal components of the new pump are constructed of highly inert materials to permit the handling of most corrosive fluids, and to prevent solution contamination. The unit is easily disassembled. Another feature is the use of mechanically actuated valves which

insure leak-free performance without high back pressures.

(Request Item No. J-14)

Compact Heat Exchangers



Major changes in design, engineering and construction of standardized compact heat exchangers are incorporated in a new line introduced by Basco Inc., North Tonawanda, N. Y.

Designated as Type 500, the compact exchangers are available with shell diameters from 3¼″ through 8¼″ and in lengths from 1′4¾″ through 6′7″.

Ferrous materials for shells, connections and bonnets are designed to form an exceptionally strong and durable structure that can withstand pressure surges and the corrosive action of synthetic oils and hydraulic fluids.

Elimination of hubs (commonly used on this type of exchanger) is designed to overcome the problem of leakage resulting from casting porosity and improper soldering or brazing. Basco's Type 500 units meet heating and cooling requirements where fluid temperatures must be closely controlled with a compact exchanger. One, two and four-pass models are carried in stock for immediate shipment.

(Request Item No. J-15)

Anti-Static Lubricant

The Organic Chemicals Division of Emery Industries, Cincinnati, Ohio, is offering a new economy-priced, anti-static lubricant, Twitchell 7428 oil. It is designed to provide effective static control, easy removal and balanced penetrating and spreading properties. It may be used in all conventional application systems, or sprayed in emulsions as concentrated as a water-to-oil ratio of 2 to 1.

(Request Item No. J-16)

For the Mill Bookshelf

Heat Exchanger Line

Basco Inc., North Tonawanda, N. Y., has provided information on its line of stock model compact heat exchangers in a new illustrated 4-page bulletin. Standard sizes, dimensions and weights are listed for one, two and four-pass exchangers with shell diameters from 3¼″ through 8¼″ and lengths from 1′ 4¾″ through 6′7″.

(Request Item No. J-17)

Hydraulic Press Catalog

Its complete line of presses—30, 50, 75 and 100-ton Hydrolair and the 30-ton Hydraulic Laboratory—are currently being featured in a new 2-color 8-page catalog (No. 6106) published by South Bend Lathe Inc., South Bend, Ind.

Specifications on all air-powered Hydrolair and hydraulic presses, hot plates and accessories are listed in separate sections in detail for easy reference. Color diagrams of the Power-Petuator air-hydraulic intensifier provide an explanation of this feature. One section is devoted to the 30-ton bench type laboratory press.

Price sheet for presses, optional features, hot plates and accessories are also available.

(Request Item No. J-18)

Vat Dye Leveling Agents

A new manual on the most effective use of leveling agents in vat dyeing is being offered by Sou-Tex Chemical Co. of Mount Holly, N. C. The booklet contains 14 graphs and tables which cover many and various applications of caustic soda, hydrosulfite and salt-additions in vat dyeings.

(Request Item No. J-19)

G. E. Recorders

General Electric Co., Schenectady, N. Y., has published a new product bulletin describing its line of direct and servo-operated, switchboard and portable recorders. The bulletin relates information on 19 different types of

single and multi-pen, ink and inkless, strip and round chart recorders. For selection purposes, the recorders are described in accuracy classes of 1/4, 3/10, 1, 2 and 3%. The bulletin also lists over 40 different electrical and physical parameters that can be measured by these recorders in various utility and industrial applications. Other information includes: specifications, dimensions, applications, features, operating data, optional accessories and photos of the recorders.

(Request Item No. J-20)

Heating & Cooling Systems

Technical Data Bulletin No. 356, concerning heating and cooling systems, is available from Dean Products Inc., Brooklyn, N. Y. The bulletin is fully illustrated with sketches, photographs, tables and graphs and contains information on heating, cooling and heat transfer not published before. Other features of the publication include: an instantaneous LMTD chart; how to figure heating load; how to select heating surface; pressure drop short cuts; etc.

(Request Item No. J-21)

Steam-Detergent Cleaning

A compilation of methods and materials currently used in steam-detergent cleaning has been presented in a new, illustrated booklet released by Oakite Products Inc., New York City.

The booklet, entitled "How To Get The Most Out Of Steam Cleaning With Oakite Specialized Detergents," provides information on steam cleaning in general and lists the six essential properties which all effective detergents used in steam cleaning should have. It also features pictures and technical specifications of the Hurriclean steam-detergent gun and the new, lightweight Steam Pistol plus a descriptive outline of the more successful materials now used in steam-detergent cleaning.

(Request Item No. J-22)

Cellophane Code System

A new code system for designating Avisco cellophane types and designed to offer a simple and direct method by which packagers can compute unit packaging costs has been released by American Viscose Corp., Philadelphia, Pa. Three digit code numbers in front of the letter designations of Avisco films are, under the new system, directly related to yield—the number of square inches per pound expressed in hundreds.

A buyer can convert the code numbers to single package wrapping costs. Before the change, code numbers represented the decigram weight of a square meter of cellophane. Also American Viscose film division has issued revised price lists incorporating the new designations.

(Request Item No. J-23)

Variable-Speed Belts

A new 20-page brochure, Bulletin 24103, titled "Variable-Speed Belts," has been published by T. B. Wood's Sons Co., Chambersburg, Pa. The booklet includes 14 pages of information about replacement of variable-speed belts.

(Request Item No. J-24)

Spectroscopy Bibliography

A new pocket-size bibliography on ultraviolet, visible and near-infrared spectroscopy has been published by Beckman Instruments Inc., Fullerton, Calif.

The 36-page booklet contains more than 250 references under headings of General, Technique and Application.

Literature in the Technique section is listed under the following captions: Absorption, Flame, Fluorescence, Spectroradiometry, Reflectance and Colorimetry. The Application section includes references pertaining to spectrophotometry in various areas of research.

(Request Item No. J-25)

Two-Dimensional Viewer For Thread Inspector

Lindly & Co., Mineola, N. Y., is making available a bulletin describing its two-dimensional viewer for its widely accepted Lindly thread and line inspector. The two-dimensional viewer incorporates a new optical system with four prisms which permits the thread to be examined from two sides, so that imperfections cannot be obscured.

(Request Item No. J-26)

Foxboro Pneumatic Temperature Transmitter

Its Type 12A Pneumatic Temperature Transmitter is described in a new bulletin from The Foxboro Co., Foxboro, Mass. Features of transmitter design are

emphasized: compact construction; force-balance operation; and—to sustain measurement accuracy—automatic compensation for ambient temperature and pressure changes.

The 12-page bulletin illustrates how easily the transmitter can be installed and adjusted to suit a wide range of application requirements.

Also included are detailed specifications, descriptions of operating principle, table of temperature ranges and data on related accessories.

(Request Item No. J-27)

Facts On Testing

A new edition of "Facts on Testing" has been published by Thwing-Albert Instrument Co., Philadelphia, Pa. The new publication features facts on physical testing of new developments in test instruments, new testing methods, new applications for test instruments, short cuts discovered by readers, useful accessories for instruments and trends in testing research and development work.

(Request Item No. J-28)

Orlon Dyeing

The Du Pont Co., Wilmington, Del., has issued a technical information sheet describing laboratory techniques for determining the dye mergibility of spun yarn of Orlon acrylic fiber. It also describes laboratory techniques for checking the fabric hand of knitted tubing of Orlon.

(Request Item No. J-29)

Engineering Specifications

A new 12-page condensed catalog has been issued to cover a complete line of electrical and lubricating devices offered by Trico Fuse Mfg. Co., Milwaukee, Wisc. Products are illustrated with photographs, catalog numbers and such engineering data as specifications and operating descriptions of automatic oilers, chain oilers, dispensers, single and multiple valves, mist systems, industrial fuses and fuse accessories.

(Request Item No. J-30)

Aldehyde Properties

A new 45-page booklet, describing the properties and uses of aldehydes, has been published by Union Carbide Chemicals Co., New York City.

The booklet contains comprehensive data on acetaldehyde, paraldehyde, propionaldehyde, butyraldehyde, isobutyraldehyde, acetaldol, acrolein, acrolein dimer, methacrolein, crotonaldehyde, glyoxal, pyruvic aldehyde, glutaraldehyde and 2-hydroxyadipaldehyde.

Also included is information on physical properties; constant-boiling mixtures; specification limits; test methods; storage, handling and shipping; toxicological properties; and selected literature references.

(Request Item No. J-31)

New American Standards

Colorfastness to peroxide bleaching and the resistance of textiles to mildew and rot and evaluation of textile fungicides are subjects of two revised American Standards approved and published by the American Standards Association, New York City.

Specified in "American Standard Colorfastness to Peroxide Bleaching (A.A. T.C.C. 29-1957), L14.58-1960" are methods of test, specimens, procedure and apparatus for evaluating resistance of cotton and linen textiles (containing both colored and uncolored parts) subjected to action of hydrogen peroxide bleaching. The standard updates the procedures specified in an American Standard approved in 1956.

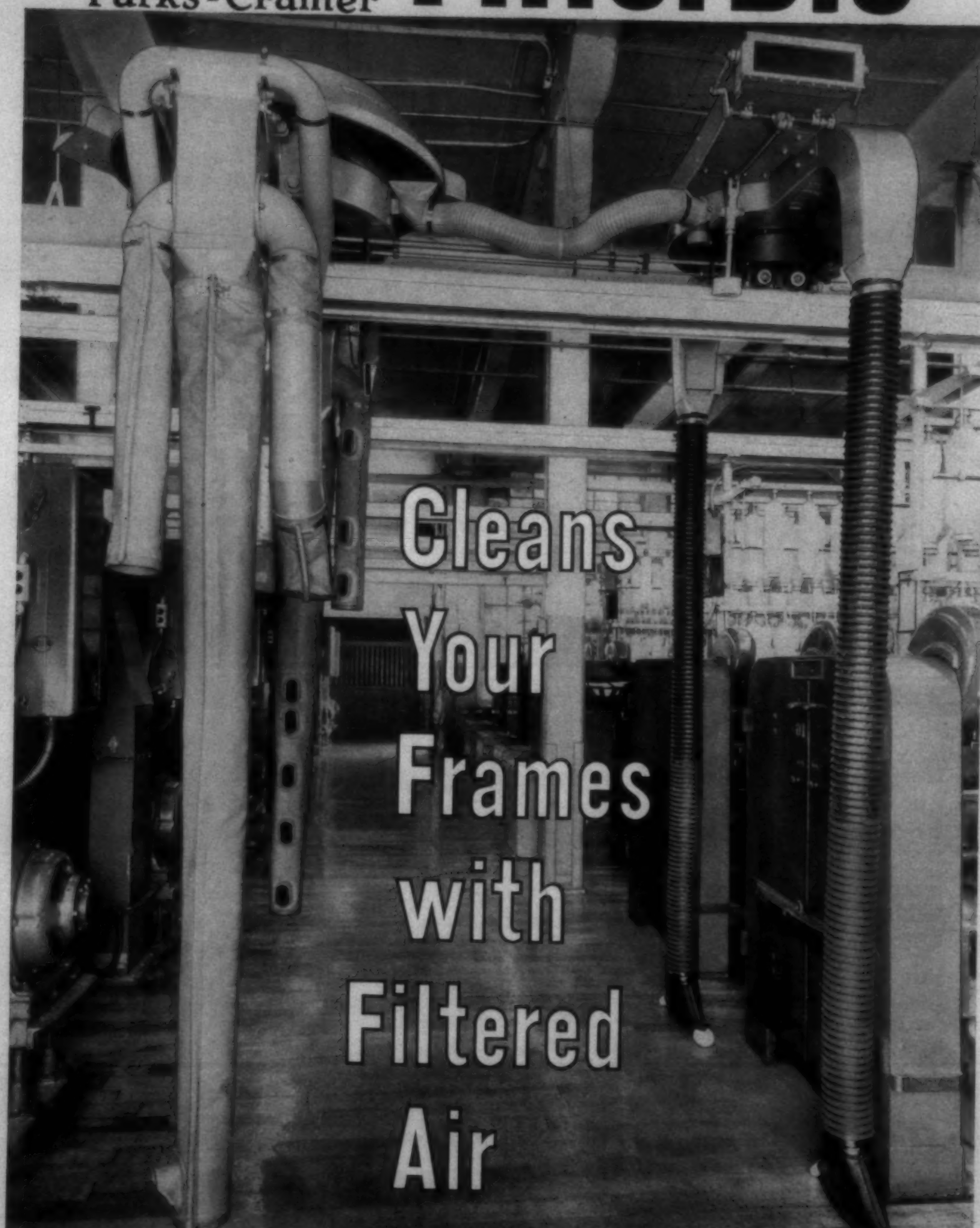
Procedures for determining the behavior of textiles with respect to mildew and the evaluation of mildew preventatives available are offered in "American Standard Resistance of Textiles to Mildew and Rot, and Evaluation of Textile Fungicides (A.A.T.C.C. 30-1957), L14.55-1960."

Both the American Association of Textile Chemists & Colorists and the American Society for Testing Materials are administrative sponsors of the project. Copies of the standards are available from the American Standards Association, 10 E. 40th St., New York 16, N. Y. American Standard L14.58-1960 sells for 40 cents a copy; L14.55-1960, 50 cents.

ACIL Directory

The American Council of Independent Laboratories, Washington, D. C., has announced the availability of the eighth edition of its ACIL Directory. The directory may be obtained by a request on company letterhead to the ACIL, 4302 East-West Highway, Washington 14, D. C.

Parks-Cramer **FilterBlo**



Serving The Textile Industry

Leesona Sales Down 12% During First Half Of 1961

Leesona Corp., Providence, R. I., reports a 12% drop in its sales for the first half of this year. Total income during the period was $14.2 million as compared with $15.9 million a year earlier. Earnings amounted to $803,087 as compared with $1.4 million a year ago.

The decline in sales was attributed to the overall decline in the textile industry which started during 1960. Lower profits were the result of the decrease in sales and higher costs, particularly those in the development of the company's Uniconer.

Leesona's current loans jumped from $750,000 to $2.3 million in the period. Included in this figure is $772,577 for a new building and additional receivables and inventory of $1.4 million.

Whitin Gets $10 Million Loan, $15 Million Credit

Whitin Machine Works, Whitinsville, Mass., last month completed negotiations with Metropolitan Life Insurance Co. of New York for a 15-year multi-purpose loan of $10 million and the establishment of unsecured lines of bank credit in excess of $15 million. The latter is for its wholly-owned and recently formed corporation, Whitin Capital Corp., established to handle the customer installment paper of Whitin for all its subsidiary companies.

Vaughn E. West, Whitin treasurer, indicated that portions of the loan funds would be used to consolidate existing long and short-term loans through the payment of all present bank debts; and to provide additional working capital needed due to growth of Whitin subsidiaries.

Principal subsidiaries of the company include American Type Founders Co., Elizabeth, N. J., and Fayscott Landis Machine Corp., Dexter, Me. Whitin's extensive export business is handled through Whitin International Ltd.

Lindly Six Months Sales, Earnings Show Increase

Sales of electronic process and quality control equipment in excess of $300,000 for the first six months of the year have been announced by Lindly & Co., Mineola, N. Y. Profit increased 24% over that of the corresponding period for 1960. If maintained through December, this rate of profit would set another high for the company.

There was a larger than usual backlog of orders on hand as of the end of July, and a substantial volume of foreign sales has aided considerably in offsetting the effects of the business recession in this country during the first quarter.

Roberts Co. Will Expand Southeastern Loom Works

Roberts Co., Sanford, N. C., completed negotiations September 5 for purchase of Southeastern Loom & Machine Works, Greenwood, S. C.

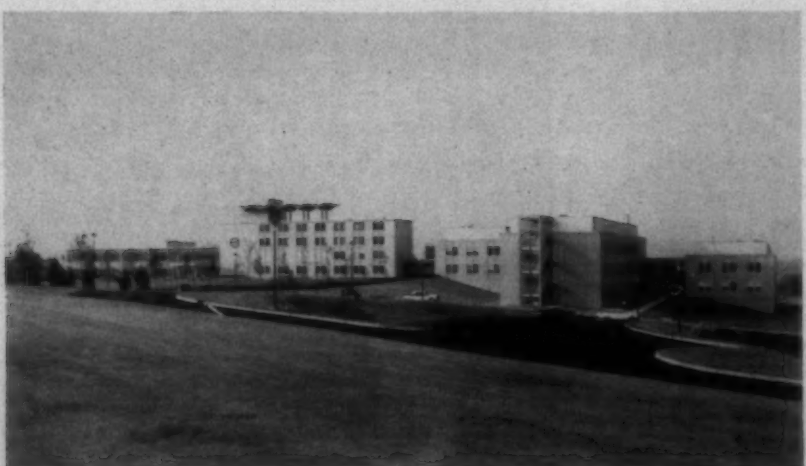
Formerly a division of Abney Mills, Southeastern produces loom repair parts, card coilers and roving frames. Included in the sale were Southeastern's complete gray iron foundry and all machinery, equipment, tooling and patterns. The Southeastern plant, containing some 135,000 square feet of space on a 38-acre site, was built in 1957.

Roberts plans to expand and modernize the foundry, increasing its employment from 175 to 300 workers within a year. In addition to loom repair parts, the facility will also be used for production of yarn making equipment.

Roberts, with 750 employees and five plants in Sanford, is now in its thirteenth year. The firm recently completed the private sale of a $1 million 10-year 6% subordinated debenture, allowing the purchase of 140,000 common shares at $7 per share. Purchasers were Florida Capital Corp., Palm Beach, Fla., and Federated Capital Corp., New York City.

Koppers Co. Dedicates Its $8 Million Research Center

Koppers Co. Inc. of Pittsburgh, Pa., a leading producer of chemical products for the textile industry, took a giant step forward in its accelerated research program August 28 with the formal dedication of a new $8\frac{1}{2}$ million research facility in Somervell Park, Monroeville, Pa., a Pittsburgh suburb.



In this view of the facility from the main entrance to Somervell Park, the library and cafeteria wing is shown on the left. The entrance and lobby are just left of the tall building in the center which houses all administrative offices and an auditorium. At the right are typical laboratory wings, projecting alternately north and south from a glassed-in corridor which connects the administration building to the wings. At the near end of the closest wing is one of the glass-enclosed steel stairways, typical for each laboratory wing, which may be removed if it should be necessary to extend the length of the building.

The largest as well as newest of the company's nine research facilities, the 350,000 square foot center is described as one of the most advanced in the country. Now about one-third its ultimate size, it will eventually house some 1,500 research personnel. In addition to all new product research, an exploratory section

"This Dillard paper is much better than your cloak, Walter!"

of the center's central research staff will work in areas wholly new to Koppers.

Koppers is a 49-year-old company with annual sales in excess of $300 million. It began to accelerate its research program about 15 years ago when it moved into chemicals and plastics. Until that time it had been largely identified with engineering and construction — mostly in the steel industry; coal by-products, wood preserving, fabricated metal products and merchant coke plants.

The diversification has led to interest in developing such products as plastics for use in building materials, fiber reactive dyes and chemical intermediates. Now in final developmental stage is a non-precipitating dye which imparts permanent coloring to anodized aluminum. Another current project that Koppers believes holds great promise involves the desalinization of sea water.

Sales of the company's chemical and dyestuff division totalled $15.6 million in 1960.

Plans Moving Along For 1962 Show At Greenville

Textile Hall Corp., Greenville, S. C., has announced applications for space in the 22nd Southern Textile Exposition to be held October 15-19, 1962, in Textile Hall, have been mailed to some 500 textile industry suppliers. Approximately 250 firms already have made tentative application for space. The 1960 exposition had 380 exhibitors.

The 1962 show will be the last in the present Textile Hall on West Washington Street. Plans are being drawn for a new hall to be constructed on a 30-acre site adjoining Greenville Municipal Airport, and exhibitor suggestions for the new building are now being sought.

Sirrine Will Move To Its New Offices Early In '62

The new office buiding for J. E. Sirrine Co., engineers and architects of Greenville, S. C., is progressing on schedule and is expected to be ready for occupancy early next year. As might be expected, the 32,000 square foot, two-story, air conditioned building incorporates a number of unique features. The second floor extends over the first providing shade for the first floor window areas and also sheltered access to the building. Drafting rooms and departmental offices are on the second floor. Executive offices, conference rooms, a reception area and a security vault for drawings are on the first floor. The executive office suite overlooks a formal garden at the south end of the building. A parking lot is provided on the 3½-acre site for 150 cars.

Film Plugs Belfast For Store Personnel

"Patent No. 2,985,501" is the title of the new training film presented by Deering Milliken Research Corp. to tell the story of its Belfast self-ironing cotton.

The 35 mm film strip with sound was prepared to augment the training on Belfast cotton that is done in the stores by the Milliken Merchandising Consultants. The running time of the film is approximately seven minutes. Question and answer periods are used with it to acquaint store personnel with Belfast products.

The film describes the cotton fiber itself—ranging from the cotton's construction to what causes it to wrinkle. Explaining the different methods that have been employed in wash-and-wear fabrics, it also describes the chemical modification of Belfast cottons.

Portions of the film were photographed at the Deering Milliken Research Corp. in Spartanburg to show the quality control methods set up for the process at the plant.

James Hunter To Make Krofta Water Clarifiers

The James Hunter Machine Co., North Adams, Mass., has agreed with Krofta Engineering Corp., Lenox, Mass., to manufacture the latter's line of water clarifiers used in the treatment of industrial waste water. Krofta was organized in 1955. Its flotation units have found their widest use in paper mills, but tests have shown they will also clarify waste from cotton mills and other operations where water treatment is a problem.

Chemstrand Cuts Prices On Acrilan Carpet Fiber

Chemstrand has announced a reduction in the price of Acrilan acrylic carpet fiber and other changes in pricing schedules, effective on all orders booked after September 14. The price of 15-denier acrylic carpet fiber was reduced from .89 to .74½ cents per pound, and the price of 2, 3 and 5-denier Acrilan staple will be $1.18 per pound, a reduction from $1.22. The price of Acrilan tow in all deniers will remain at $1.22. For Acrilan Type 77, Type 88 and Type 89, the price was changed to .94 cents per pound from .97 cents per pound.

Stein, Hall And Swiss Firm Form Sales Office

Stein, Hall & Co., a major supplier of starch and chemical specialty products to the textile industry, is organizing a new chemical company in Switzerland for the sale of products manufactured by Stein, Hall and a Swiss firm, Meypro AG. The latter is a major producer of natural gums and chemically treated derivatives for the textile, paper, food and pharmaceutical industries. It has plants in Kreuzlingen, Switzerland, Zaadam, Holland, and subsidiaries in Holland and Germany.

Metal Plating, Finishing Offered By Jenkins Metal

Jenkins Metal Shops of Gastonia, N. C., has expanded its facilities to include metal plating and finishing. Services offered include plating chrome, nickle, cadmium, zinc, black oxide plating, phosphating, irridite finishes and others. Jenkins also offers organic paint finishes in spray painting or baked enamel finishes.

Southern Research Adds To Its Expanding Labs

A number of unique tools for the study of new polymers have been added to the expanding textile laboratories at Southern Research Institute, Birmingham.

Facilities for wet, dry and melt spinning of synthetic fibers, capable of producing monofilament or multifilament yarns, have been installed to permit evaluation of the fiber-forming characteristics of new polymers or modified forms of existing polymers.

The equipment is adapted for spinning such materials as polypropylene, polyethylene, nylon, polyesters, cellulose acetate, acrylic polymers and polyvinyl alcohol. Polymer batches as small as 25 grams may be spun. Built by institute personnel, the equipment will be used to study fundamental relationships between chemical structure and fiber properties, to study the effects of additions of other polymers to polypropylene to provide dyeability, and to study new finishes, anti-static agents or germicides added to the polymer before fiber formation.

textile bulletin

VOL. 87 OCTOBER 1961 NO. 10

Quality Control In Woven Stretch Fabrics

A LOOK AT SOME OF THE PROBLEMS ENCOUNTERED BY MILLS AS THEY GO INTO THIS FAST GROWING FIELD

By B. L. HATHORNE*
Sedgefield Laboratories Inc.
Greensboro, N. C.

CURRENT production of stretch yarns is well in excess of 40 million pounds a year, 20 million of which are being produced within 25 miles of Greensboro, N. C. Of this, the weaving industry consumes less than 10%, due to an acute shortage of yarn available to weavers. (This will be ameliorated when machines currently being built are put into operation).

The quality of these stretch thermoplastic yarns is, for the most part, excellent. This is proven by the fact that even though most spindles in place are running seven days a week around the clock, there is still an acute stretch yarn shortage. We can therefore start with the premise that yarn texturers are, as a group, producing good uniform yarns that can make good uniform quality fabrics. And while there are minor differences in equipment used to produce these yarns, all of the several brands can produce yarns equally satisfactory for weaving. This does not mean that all torque crimp yarns currently being produced are satisfactory for weaving. It does mean that all types of equipment currently in place can be so set that good weaving yarns can be produced.

Skipping lightly over the part that fabric design plays, let me say only that:

(1) Fabrics cannot stretch until they first shrink, therefore construction must provide for shrinkage; there must be spaces between thread and picks to permit the fabric to shrink when the latent torque forces are activated; and

(2) Maximum stretch and shrink is developed by maximum yarn lengths, therefore floats in the stretch yarns must be utilized, though often limited to two threads or picks as in a 2x2 twill.

Stretch Warp Vs. Stretch Filled Fabrics

Stretch filled fabrics were developed in this country utilizing research funds provided by the inventors and manufacturers of stretch yarn processing machinery—The Permatwist Co. of Coatesville, Pa., and the Leesona Corp. of Providence, R. I. Excellent stretch filled fabrics were produced as early as February 1957 and have been available to cutters since that time.

*From a paper delivered before the Fall meeting of the Textile Quality Control Association, Oct. 5-6, Greensboro, N. C.

Though substantial yardages have been made and consumed the growth of interest in these fabrics has been but a fraction of what it would have been had promotional funds been available. Understandably synthetic yarn producers reserved their promotional funds for their own processes and brand names, and yarn texturers could not justify serious promotional expenditures at the price levels for which the yarns have been sold and continue to sell.

For this reason—the almost total absence of promotion—cutters were slow to buy stretch filled fabrics because department store buyers, not knowing of their existence, did not demand this type of merchandise, and converters refused to gamble their funds because there appeared to be only a modest demand for the goods.

Fortunately, one large weaver had the courage to market these new and different fabrics based on their merit, thus gradually creating a demand even though the fabrics were sold at substantially higher than average prices. Gradually a modest and growing market for stretch filled goods has developed even though a co-ordinated promotional program does not yet exist.

Stretch warp fabrics were developed in Europe primarily for the ski trade. Rather than seeking to produce the very cheapest fabrics that could be called stretch, European manufacturers elected to produce the very best fabrics they were capable of designing and making, then priced these fabrics to show exceedingly attractive profits.

Substantially cheaper versions of European stretch warp fabrics have been designed and produced in this country, for casual lounging wear rather than for ski usage. Demands for cheaper and cheaper fabrics, even at this early state of the development, have led to the production of fabrics possessing less stretch and recovery than is conducive to customer satisfaction and creating serious quality control problems, many of which are erroneously being blamed on the handling techniques of dyers and finishers.

Indications are that these "too cheap" fabrics will quickly fall into disuse and that the better quality stretch warp fabrics, much easier to control in weaving and in dyeing and finishing, will increase rapidly as soon as adequate supplies of stretch yarn for weaving are made available to weavers.

Stretch Filled Fabrics

Stretch fillings have been woven in a number of different warps; for example, low twist nylon and polyester warps,

stretch nylon and polyester warps, rayons, acetate, and triacetate warps, and, more recently, cotton warps. At this time it appears that cotton warp stretch filled fabrics may be expected to out-strip all of the others and will become a very substantial factor in the market.

Actually fabrics primarily cotton in appearance and hand, yet possessing the advantages of stretch, constitute the only really new development in fabrics essentially cotton since the advent of resin-treated cottons.

Current style trends would seem to favor rapid development of stretch filled cotton warp fabrics as these fabrics possess a pleasingly soft hand, excellent drape, and can be produced with unusually fine wash-and-wear characteristics, provided that fabric design and dyeing and finishing techniques are properly married; and provided that colors fast to washing, light and chlorine are used.

Warp Twist

Warp twist plays a very important part in the stretch, crepe effect, hand and drape of stretch filled fabrics. When synthetic warps and rayon and acetate and tri-acetate warps are used, the warp twist should be as low as can be successfully woven to reduce to a minimum the resistance to the shrinking action of the torque crimp filling.

When cotton warps are used the reverse is true. The higher the twist, the better the stretch and recovery of the finished fabric, because the diameters of the cotton yarns are reduced by twist, thus providing more space between individual threads, permitting the filling to shrink much more during boil off, and permitting more of the shrinking or contracting power of the stretch filling to remain in the yarn rather than wasting itself attempting, unsuccessfully, to compress loosely twisted soft warp yarns.

Warp Size

Choice of warp sizing ingredients, the ratios of the various ingredients used and the quantity of warp size applied very seriously affects the type and quantity of crepe or stretch and recovery that can be developed in most constructions, particularly when synthetic yarns are used in the warp. If the sizing ingredients applied are of such a nature that it is possible to remove a major portion of the size at or below 100° F. then the latent torque crimp energy existing in the filling can be utilized pushing against a number of relatively loose individual filaments rather than against a group of filaments bound together as a rigid rod.

For example, polyethylene dispersions are known to produce very excellent weaving polyester warps. Polyethylene dispersed sizes can be removed at or near the boil—quite satisfactory from the viewpoint of subsequent dye application but highly unsatisfactory from the viewpoint of stretch results, as the bulk of the latent energy in the torque yarns exhausts itself pushing against heavily sized yarn in the lower temperature brackets where the bulk of the torque crimp energy is released.

Polyacrylic type size, also satisfactory for polyester yarns, can be almost completely removed at or below 100° F. providing sufficient time and mild alkali are provided, thus making possible the utilization of the energy in the filling yarn in the production of crepe and stretch rather than causing it to be wasted pushing against relatively rigid groups of filaments bound together by size.

Cotton warp stretch filled fabrics should be sized with partially converted or dextrinized starches, preferably augmented with soluble film forming materials rather than with unconverted starches, and should be lubricated with waxes that wet out instantaneously in strong caustic rather than with hard to penetrate, less readily soluble waxes.

Warp Tension

Warp tension should be relatively low to permit some bending of the warp threads. The important factor, however, is that the tension shall be maintained as uniformly as possible throughout the length of the warp and from warp to warp—this to permit a greater degree of uniformity from piece to piece in the finished fabric. Substantial variations in warp tension can produce discernible variations in the hand, appearance, drape and stretch of the resultant dyed and finished merchandise.

Selvage Construction

Most of the cotton warp stretch filled fabrics woven to date have been primarily cotton face filling back fabrics. This construction provides a typical cotton appearance and hand with the added advantage of stretch and drape provided by the stretch filling. Such fabrics tend to roll during finishing when *conventional* yarns are used. When *stretch* yarns are used this rolling tendency is increased many times over and has created very serious problems in dyeing and finishing. The basic cause of the selvage rolling of warp face stretch filled goods is tight selvage. In many constructions the selvage threads "work" more than the body of the fabric threads, causing them to become seriously stretched during weaving, then very tight when the fabrics are boiled off slack, as the over stretched ends shrink appreciably.

This shrinking causes the rolling selvage which in turn causes:

(1) Problems in dye penetration in the kettle.
(2) A different visual effect in fabric near the selvage.
(3) Break marks running diagonally from the selvage towards the center of the goods.
(4) Rope marks near the selvage.
(5) Excess labor costs for the finisher.
(6) In many instances reduced stretch in the finished goods due to variations in finishing techniques utilized by the finisher in an attempt to prevent the development of excess labor costs in his plant.

All of this can be easily avoided by utilizing selvage constructions that will not cause rolling. Proper constructions permit the selvage to work equally with the body of the fabric and provide more resistance at the very edge of the selvage and less resistance towards the body of the fabric.

Currently substantial yardages of cotton warp stretch filled fabrics are being woven with properly designed selvages, and show no sign of selvage rolling whatsoever even though the face is primarily cotton and the back utilizes long floats to provide good stretch and recovery and a pleasing soft hand.

Quilling Tension

The most critical factor in producing uniform quality stretch filled fabrics is the production of low tension uniformly tensioned quills. What may appear to be relatively minor tension variations in unprocessed yarns can cause very serious filling bands in textured yarns. Bear in mind that textured yarns contain latent torque crimp power and that this latent power or force can be activated in many ways, one of which

is by tension applied to the yarn. I have seen fabrics vary from transparent, from yarn drawn from the tip of a quill, to opaque, from yarn from the base of the quill, due only to the increase in tension that takes place from the tip of the quill to the base, this being sufficient in certain extreme instances to cause the yarn to "wake-up" when exposed to the higher tensions, thus causing the crimps to develop prematurely, producing the said opaque appearance.

The nature of torque crimp yarn, its tendency to crimp, permits the use of very low quilling tensions and very soft quills without creating the problems usually associated with low tensions. Ten to twelve grams is usually sufficient for 70 denier single stretch yarns.

The best answer to quilling tension variations is sequence weaving as provided by shuttleless looms and Leesona Corp.'s Unifil Loom Winder. Mills properly utilizing sequence weaving are having an absolute minimum of variation within individual packages of yarn and will soon be able to produce still more uniform fabrics when the new false twist machines, available in quantity this Fall, make possible the utilization of four pound knotless packages of torque crimp thermoplastic yarns.

Shuttle Tension

Uniform shuttle tension is even more important than uniform quilling tension. The shuttle should be so tensioned that yarn from the tip of the quill shows a measurable tension of not more than two grams. In addition it is very important that the fur in the shuttle shall be of uniform length and that the fur be applied so that it controls tension, lightly, at the tip of the quill and does not add to tension at the base. This requires that the fur can be applied only to the upper part of the shuttle as increased contact with the quill itself provides sufficient tension, and more than sufficient tension, for yarn drawn from the base of the twill.

If quilling tensions and shuttle tensions are correct, and if weaving is utilized, intermittent filling bands cease to be a problem, provided, naturally, that the dyer does his work correctly.

Greige Fabric Care

Many constructions utilizing stretch yarns in the filling can develop creases in the greige if improperly handled. Such fabrics should be tightly rolled and maintained in a rolled condition until they reach the dyehouse where they must still be maintained on rolls until they enter the first wet processing unit.

Control Of Release Of Latent Torque Crimp Energy

Earlier we mentioned the latent torque crimp energy imparted to stretch yarns by the yarn texturing process and the relationship of this energy to the resistance supplied by the fabric design, the characteristics of the filaments of the warp yarns, and the warp twist and warp size utilized. When the latent energy in the filling yarn is properly balanced against the total resistance in the warp, good fabrics can be produced, providing the fabrics are so processed prior to, and during wet processing and drying, that the energy is released slowly and gradually and the goods are handled thereafter in such a manner that the defective shrinking power and/or creping power remains in the goods.

As might be expected, different fabrics require totally different techniques and in different dyehouses techniques must be further varied to fit in with existing installed equipment.

In some instances fabrics are sent to the dyehouse containing an improper balance of torque crimp energy to resistance. In some instances too much torque crimp energy; in other instances, too little. When fabrics contain too much latent torque crimp energy, in relation to the total resistance of the warp, the dyer must reduce the torque crimp energy by just exactly the right amount otherwise an uneven or cracked face fabric will result. Such fabrics have been properly controlled by embossing in the greige with an engraved roller, by passing through the finish calender—straight through the nip not around a heated roll—and by partially heat setting greige goods at temperatures above the boiling point of water but substantially below true heat setting temperatures.

On the other hand when goods reach the dyehouse containing too much warp resistance and too little creping power, the dyer can sometimes save the day by processing the goods at very low temperatures, slack, utilizing size solubilizing materials, thus removing the major cause of warp resistance prior to release of the major quantity of the torque crimp power.

I do not mean this to be taken as indicating that the dyer can produce good fabrics from improperly designed or improperly processed merchandise. I do mean it to say that many dyers have been very co-operative in this stretch program and have been willing to vary their normal dyeing techniques substantially to make possible the production of commercially satisfactory fabrics from greige goods quite questionable in design or execution.

Stretch Warp Fabrics

As stated earlier the primary objective of many manufacturers who have sampled and produced stretch warp fabrics in this country to date seems to be confined solely to attempts to produce stretch warp fabrics cheaper than is commercially possible and such attempts have, as would be expected, resulted in the production of many samples lacking good stretch and recovery and fabrics exceedingly difficult for the dyer to handle.

There are of course notable exceptions. Some firms willing to make good merchandise have priced this merchandise at levels assuring them of good manufacturing profits. Such fabrics are in very short supply due to their having been shown at a time when the seasonal demand for knitting yarns was on the up-swing, with the unfortunate result of orders for stretch warp fabrics being placed at a time when additional quantities of stretch yarns were unavailable.

Quality Control Viewpoint

From the quality control viewpoint, at first look, it would appear that stretch warp fabrics are easier to control than stretch filled fabrics. This is because the major quality control problem in stretch filled fabric is *visible*—dye bands due to improper quilling and weaving tensions, and yarn variations aggravated by failure to weave in sequence. *Stretch* variations in stretch filled fabrics are mostly limited to variations in degree of stretch and recovery, not to actual *shrinkage* because heat setting is easily and readily controlled in stretch filled fabrics.

Stretch warp fabrics *appear* more uniform than stretch filled fabrics. I have yet to see a stretch warp fabric with dye

variations in the stretch portion of the goods. Weavers have maintained tensions during warping sufficiently uniform to insure good dyeing.

The quality problem in stretch warp goods is producing and maintaining uniform stretch and *shrinkage* from piece to piece.

Warp tensions vary from loom to loom and from beginning to end of a warp, enough to cause serious variations from warp to warp and within individual warps. This type of variation is controllable by weavers. It is simply necessary to slash the warps, using size removable by alkali in water at about 100° F., *and* maintain the temperature of the dry cans and the tensions during slashing at an absolute minimum. This cuts the output on the slashers but does not seriously affect cost, not in relation to the high profits currently available from stretch warp goods.

Stretch and shrinkage variations, due to variations in, and limitations in, dyeing and finishing equipment currently available in dyehouses processing these fabrics, and techniques currently used, have yet to be overcome.

Stated more blunty, no firm or branch of the industry directly affected has seen fit to finance the necessary research and capital expenditures that will be needed to produce safe methods of converting good woven stretch fabrics into good finished stretch fabrics free from stretch and shrink problems in goods designed to sell "at a price."

European Fabrics More Uniform

You may have heard the claim made that European finished stretch warp fabrics are uniform with respect to stretch and shrinkage whereas American woven stretch warp goods may vary appreciably from cut to cut, this causing serious problems in finished garments both before and after use.

The truth is that European woven stretch warp goods contain sufficient yarn and sufficient recovery to enable the warp to pull the filling picks as close together as is mechanically possible and maintain the fabric in this position until stretched and then draw it back to this position after the release of strain. This makes the fabrics relatively foolproof to handle in dyeing and finishing and assures satisfaction in the finished goods.

As stated earlier, many of the domestically designed fabrics are much lighter in weight, contain much less shrinking power, and are, rather than being foolproof, very critical to handle in that they do not have a margin of safety in respect to their shrinking capabilities.

Obviously dyeing problems could be quickly eliminated by using more stretch yarn, providing the "built-in" safety of the European fabrics. It is equally obvious that with business being what it is today in this country, we can expect cheaper, more critical fabrics, not safer to handle, more expensive fabrics.

When sufficient incentive exists, when funds for development and equipment are made available, it will be possible for finishers to deliver even improperly or too cheaply designed stretch warp fabrics relatively uniform from cut to cut and from lot to lot with respect to stretch and shrinkage properties.

Meanwhile samples are being produced at a fantastic rate and a limited number of good quality stretch fabrics are being produced in commercial quantities. Many, active in stretch, believe the future for stretch warp fabrics exceeds the future for stretch filled fabrics because stretch warp fabrics can be successfully produced on narrow looms.

Can You Blend White And Light Spotted Cottons Without Impairing Yarn And Fabric Properties?

S.R.R.L. RESEARCHERS FIND YOU CAN PROVIDED BLENDING TECHNIQUES ARE PROPERLY CONTROLLED

By **LOUIS A. FIORI,**
WILLIAM G. SLOAN
and PAUL B. MARSH*

ABSTRACT

FOUR SELECTED light spotted cottons were blended with white control cottons in various percentages and were processed into yarns and finished fabrics. Light spotted cottons of the type used in this investigation apparently can be used successfully in blends up to 25% with white cotton without impairing seriously either yarn or fabric properties in the greige state. For finished materials, there are indications that desizing, a double caustic boil-off, stripping with 10% sodium hydrosulphite and bleaching before dyeing are effective in eliminating color differences due to spotted cottons.

A LARGE percentage of the annual cotton crop is exposed to weather damage and becomes discolored. This affects adversely its market value, since this cotton is classed as either spotted (light and full), tinged, yellow stained or gray, depending on the degree of discoloration. Available information indicates that spots on cotton are either microbially or environmentally induced, and in many cases, can be qualitatively identified *(11, 12, 16, 17, 21, 24. See references at end of article)*.

The average discount per bale covering all grades of spotted cottons (Upland) during the last 10-year period was $20.82 *(8, 9)*. The percent of all spotted cottons for this same period averaged 16.5% *(9)*. There were over 3,000,000 bales of middling and above spotted cotton with the majority being classed as light spotted in the 1959-60 supply *(21)*.

Penalties imposed on spotted cotton are due mostly to general impression that all spots reduce processing efficiency and cause imperfections in finished fabrics. Information on the processing performance of spotted cotton is general and too contradictory to substantiate this assumption. One report indicates that the purchase of light spotted cotton is "the best buy in the raw cotton industry" and that there is no difference between white and light spots which could not be easily eliminated by the addition of small percentages of white cotton with the spotted *(2)*.

Another study *(15)* on the quantities and qualities of raw cotton required for major types of cotton textile products shows that varying percentages (from 2 to 62%) of spotted cottons are used in all the fabric types surveyed, including such quality items as print cloth, combed broadcloths, combed lawns and organdies.

A study *(19)* emphasizing savings in raw cotton cost by using spotted or otherwise off-color cotton shows that the appearance of yarns spun from spotted or light spotted cottons will usually be equal to those spun from white grades, and that most light spotted cottons may be bleached and dyed satisfactorily with results that usually equal those of white grades.

In contrast, experimental processing studies conducted by A.M.S., U.S.D.A. *(7)* on small samples have indicated that cotton classed into the spotted and light spotted grades generally had fiber properties and spinning and finishing characteristics inferior to the corresponding white grades. A study *(6)* on color versus fiber fineness, where specific types of discoloration in cotton are related to performance, showed that bolls killed by freeze will bleach readily and dye in accordance with their cell-wall thickness or maturity; cottons discolored due to excess iron content bleach with difficulty and do not dye as well as samples low in iron content.

Another report dealing with a specific type of microbially damaged cotton (cavitomic) indicated that this type of fiber was associated with lower spinning efficiency and yarn strength, increased waste, more uneven yarns and reduced fiber length *(10, 23)*. Another source *(4)* reported that the occurrence of "doughnut" fibers in a mix caused increases in end breakages in spinning.

Obviously, the processing behavior of spotted cottons as reported is not similar. To obtain optimum utilization of spotted cottons and provide a quantitative basis of determining their true quality in terms of performance, spotted cottons should be identified as to type and then characterized in terms of effects on: (1) product quality; (2) spinning efficiency; and (3) finishing behavior. This discussion covers very limited processing performance evaluations of four weathered cottons; two microbially damaged *(Aspergillus flavus* and high pH), and two environmentally damaged (clay and frost) in blends with white undamaged cottons.

Materials And Methods

Samples: Four independent types of weathered cotton samples and respective controls were used:

Fluorescence (BGY): This type of discoloration is normally referred to as "cateye" or yellow spot *(5, 11)* and is caused by the fungus *Aspergillus flavus*. This type of fungus and spot can be identified by a brilliant greenish-yellow color under ultraviolet light *(16)*. In this case, it was further identified by comparisons with pure cultures and by chromatographic identifications of the fluorescent pigment.

High pH (HPH): This type of cotton is not normally discolored but is characterized by a high aqueous extract pH. Commercially high pH cotton has frequently been referred to

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Table 1—Chemical-Physical Data Characterizing Four Types of Spotted and White Control Cottons

Cotton	pH	Copper Reduction Value	Alkali Centrifuge Value	Moisture Equilibrium Value	General Comments
BGY					
White	6.8	.99	192	16.0	No evidence of "Aspergillus flavus" based on fluorescent test.
Spot	6.0	.24	200	16.3	Bright greenish-yellow fluorescent spots typical of "Aspergillus flavus." Checked chromatographically with pure culture. Also traces of aspergillus niger and Rhizopus. "Doughnut" type fibers.
HPH					
White	6.2	.60	187	15.2	No evidence of infestation.
Spot	9.2	.29	226	15.2	These tests, plus microscopical examinations, indicate that this may be a type of damage referred to as "cavitomic."
HS					
White	7.2	.66	205	14.7	No evidence of frost induced spots.
Spot	6.25	2.24	214	16.6	High degree of browning under influence of heat (160° C.) for 10 minutes.
HI					
White	6.6	.60	195	16.4	No exceptional browning when heated to 160° C. for 10 minutes. Has a slight brownish cast to the eye which bleached out promptly with Clorox.
Spot	7.8	.03	196	14.7	Clay spots present based on Clorox test.

as "cavitomic," a concept which also indicates an idea of microbial fiber damage *(12, 10)*.

High Iron (HI): This type of spot is induced through contact of the fiber with clay soil. It can be identified by application of a simple Clorox test *(13)*.

High Sugar (HS): This type of cotton is characterized by a high level of reducing sugars and is commonly found in areas where the plants are subjected to low temperature at the time of boll opening. The sugar is a precursor of brownish color in the fiber *(18)*.

Controls (W): These consisted of white cottons of about similar properties to the respective weathered cottons.

Each type of spotted cotton was matched with a white control cotton of comparable fiber properties considered to be free from any weather damage. For identification purposes, the spotted cottons are referred to in this report as: (BGY), (HPH), (HS), (HI) and all the white control cottons as (W).

Table I shows chemical-physical data used to characterize the weathered cotton, and Table 2 shows fiber property data for the spotted and corresponding white control cottons.

Each individual set of spotted and white cotton should be considered separately in evaluating the results obtained in this study; that is, the BGY versus its control, the HPH versus its control, etc. This study does not propose to make comparisons among sets of cotton, although the data might be used for this type of comparative analysis, since the fiber properties of the cottons are not too dissimilar.

Blending Procedure: Each individual bale of cotton was thoroughly blended to insure a homogeneous mass of fibers, and the spotted and white cottons were blended in proportions of 25%, 50% and 75% into 50-pound lots.

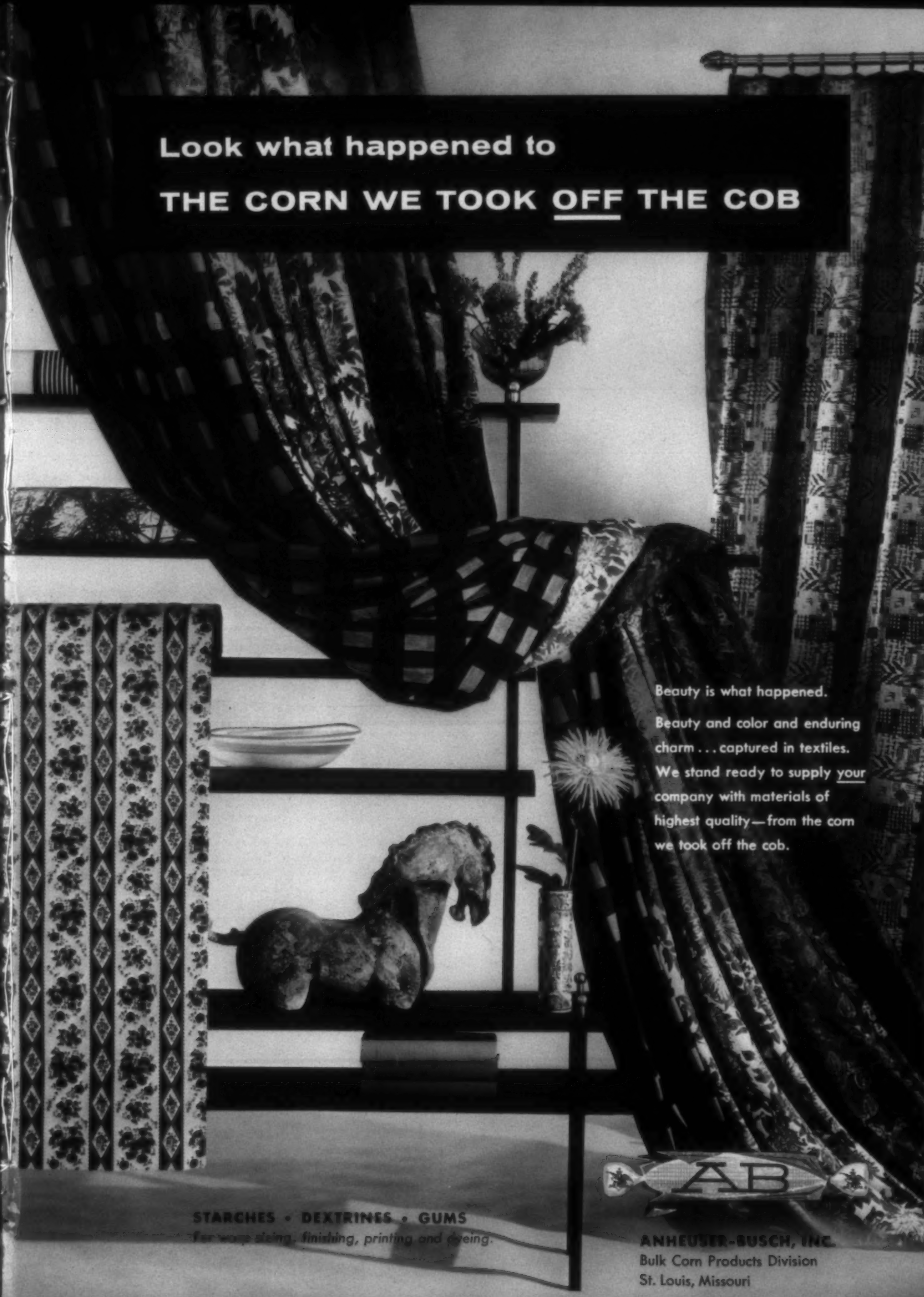
Processing Procedure: All lots were processed alike in replicate on conventional processing equipment into three yarn numbers; namely, 14/1 (42 Tex), 22/1 (26 Tex), and 36/1 (16 Tex) at varying twist multipliers (3.5 to 5.5 in increments of 0.5 twist multiplier).

Finishing effects were evaluated by spinning small portions of each lot into 36/1 (16 Tex) yarn using a 3.5 twist multiplier and 40/1 (15 Tex) yarn using a 3.85 twist multiplier. The latter yarn was knitted into a tubular fabric while the former yarn was used as filling in a standard print cloth construction (80x80) having a common warp. These fabrics were subjected to typical commercial finishing treatments and

Table 2—Fiber Properties of Four Types of Spotted and White Control Cottons*

Fiber Property	BGY White	BGY Spot	HPH White	HPH Spot	HS White	HS Spot	HI White	HI Spot
Length								
Classer (in.)	1-1/16	1-1/16	1-1/32	1-1/16	1-1/32	1	1-1/32	1
Array								
Upper Quartile (in.)	1.12	1.16	1.16	1.23	1.12	1.11	1.18	1.11
Mean (in.)	.90	.92	.93	1.04	.88	.88	.98	.93
Coeffient of Variation (%)	34	35	31	27	35	34	28	28
Weight Less Than ⅜" (%)	8.28	9.91	7.25	5.46	9.47	9.29	4.87	5.48
Grade	M	M Lt. Sp.	M	M Lt. Sp.	M	SLM Lt. Sp.	M	SLM Lt. Sp.
Fineness								
Micronaire Reading	4.80	4.82	5.40	4.58	4.42	4.18	4.75	4.85
Tenacity								
0 inch gage length (g/tex)	43.4	39.5	36.2	32.3	35.4	29.9	35.8	39.2
⅛ inch gage length (g/tex)	23.5	20.6	19.1	18.7	17.1	15.8	18.1	19.3
Elongation								
⅛ inch gage length (%)	7.9	8.2	9.1	10.5	8.2	11.3	8.9	8.4

*Based on 2nd drawing sliver.


Look what happened to
THE CORN WE TOOK OFF THE COB
Beauty is what happened.
Beauty and color and enduring charm . . . captured in textiles. We stand ready to supply your company with materials of highest quality—from the corn we took off the cob.
STARCHES • DEXTRINES • GUMS
For warp sizing, finishing, printing and dyeing.
AB
ANHEUSER-BUSCH, INC.
Bulk Corn Products Division
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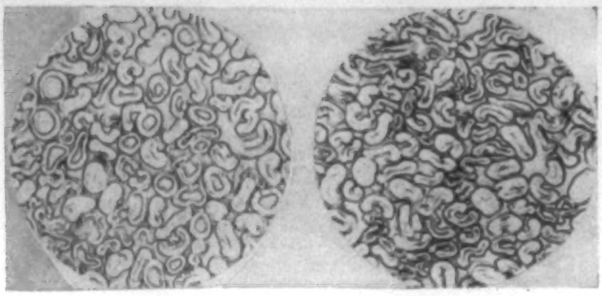

BGY White Control

Fig. 1—Cross-sectional photomicrographs of BGY spotted and white control cottons.

HPH White Control

Fig. 2—Longitudinal photomicrographs of HPH spotted and white control cottons.

also to limited experimental laboratory finishing techniques.

Testing Procedure: Skein and strip strength determinations were made on a pendulum-type tester *(1a)* and an instrument which provides a constant rate of extension *(1b)*, respectively; single strand strength and break elongation measurements on an automatic Uster Single Strand Tester*; fiber tenacity and elongation properties on the Stelometer* *(22, 1g)*; all other fiber properties *(1c, 1d, 1e)* and yarn appearance grades *(1f)* on well-known conventional testing instruments; and yarn uniformity on the Uster Uniformity Meter.* Neps were counted at the card during the beginning, middle and end of the stripping cycle and further evaluated with the Nepotometer*.

Results And Discussion

The processing performance of each type of spotted cotton and its corresponding white control cottons were evaluated independently. Because of known problems of representativeness and use of only one bale of cotton for each type of weathered cotton, performance differences between the 100% spotted and corresponding white control cotton should be accepted with reservation—in spite of approximate equality of their respective fiber properties.

Microscopic Evaluations: Fig. 1 shows cross-section photomicrographs of the BGY and white control cottons. The "doughnut" fiber was originally noted by Bailey *(4)* and subsequently shown to be caused by *Aspergillus flavus (14)* readily identifiable by a bright greenish-yellow fluorescence. A further examination of this matter in the present investigation has disclosed that the "doughnut" fiber condition is typical of cotton which has suffered microbial damage in the field in the tight lock condition *(17)* and can be brought about in the laboratory by pure culture incubation of undried fiber with any of several micro-organisms. The cotton sample which was examined was the spotted and not the white cotton in the bale classed as light spotted so the large predominance of doughnut fiber is expected. When this bale is blended with white cotton, the percentage of "doughnut" fibers probably becomes less than 1% and their reported adverse effect may be largely eliminated or minimized.

Fig. 2 shows longitudinal photomicrographs of the HPH and white control cottons. The HPH sample shows rather extensive fiber damage when compared with the control. Fiber damage has been reported to be associated with high pH and low copper reduction values, such as shown for the HPH cotton in Table I. However, it has been reported that the detrimental effects associated with this type of weathered cotton are dependent on the length of time that the cotton is in a state of high pH and lower copper reduction value, so it is extremely difficult to predict the processing performance of such cotton, either in the 100% form or blended with white undamaged cotton.

Microscopical examination of the HS and HI cottons revealed no characteristic fiber damage or fungal infestation, except that the HS cotton appeared to have more immature fibers than its control. These observations were not substantiated by the Micronaire reading (Table 2).

Neps: Fig. 3 shows nep formation data obtained during processing and with the Nepotometer for the four types of spotted cottons, corresponding controls and blends of these cottons. These data indicate that the spotted cottons studied reacted dissimilarly nepwise. The BGY and HI cottons performed equally as well as their corresponding controls while the HPH and HS cottons were more susceptible to nepping than their respective controls. In the latter cases, blending

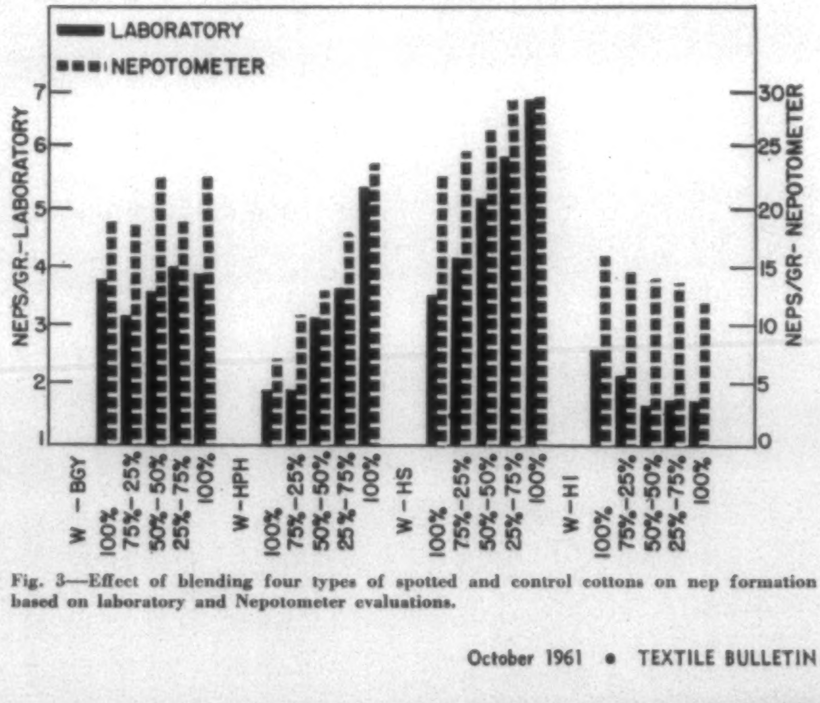

Fig. 3—Effect of blending four types of spotted and control cottons on nep formation based on laboratory and Nepotometer evaluations.

*Use of a company and/or product name does not imply approval or recommendation of the product to the exclusion of others which may also be suitable.

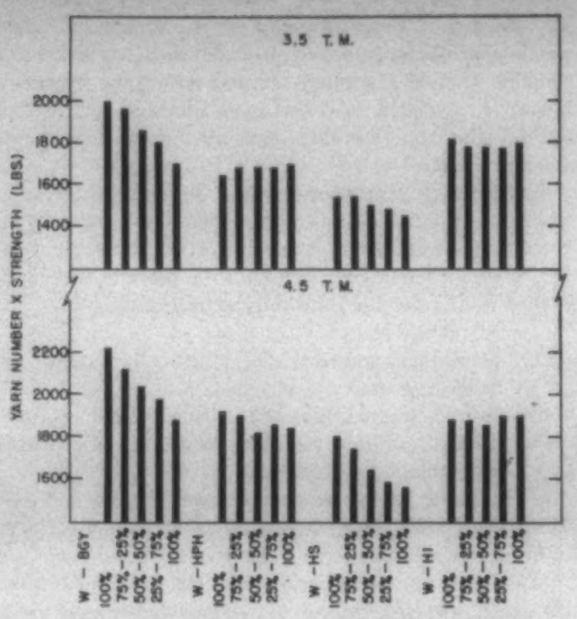

Fig. 4—Effect of blending four types of spotted with control cottons on skein strength of a 36/1 (16 Tex) yarn.

the weathered cottons with undamaged cotton resulted in linear decreases in nep formation. Since 25% of HS and HPH spotted cottons when blended with white cotton did not increase neps appreciably, it can be assumed that the white control cotton has counteracted the detrimental effects of the spotted cotton. It cannot be stated with certainty that the high nep formation of the HPH cotton when processed by itself is casually associated with the high pH condition rather than with some other coincidental property occurring in this particular sample. An examination of the conventional fiber properties in Table 2 offers no explanation of this phenomenon.

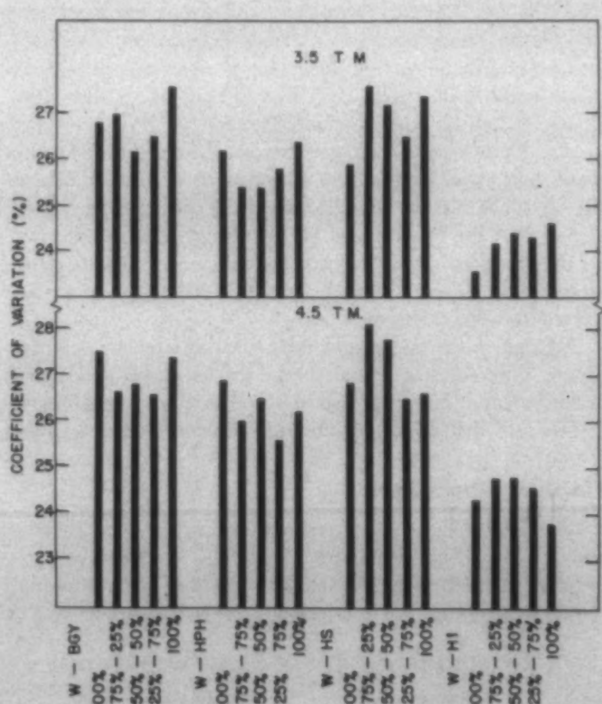

Fig. 5—Effect of blending four types of spotted with control cottons on yarn uniformity of 36/1 (16 Tex) yarn.

Strength: Fig. 4, showing yarn strength data, indicates no trends in the HPH and HI series. In contrast, the BGY and HS spotted cottons exhibited approximate linear decreases in strength proportional to the percentage content of the spotted cottons.

Figs. 3 and 4 reveal that spotted cottons which produce card webs of high nep content may spin into yarns equally as strong as yarns spun from white undamaged cottons. The HPH series exemplifies this effect. On the other hand, the HS series showed increased nep content and reduced yarn strength. The HI cotton had no adverse effect on either nep or yarn strength.

Uniformity: Fig. 5 shows no important trends with yarn uniformity data. There is no assignable explanation to the behavior of the HI series, which spun into more uniform yarns than the other cottons, particularly since the same processing organization was used for all cottons—spotted, controls and blends.

Yarn Grade: As indicated by yarn appearance data in Fig. 6, no trends were observed within any of the spotted cottons. The spotted cottons may be influencing the visual subjective evaluations associated with these types of quality evaluations as to cause such inconsistencies as noted.

Finishing Evaluations

Finishing evaluations were necessarily limited to exploratory small-scale experiments designed to detect finishing differences between the spotted and respective control cottons and to explore modifications required to minimize any differences noted.

Laboratory Experiment No. 1: Samples of control

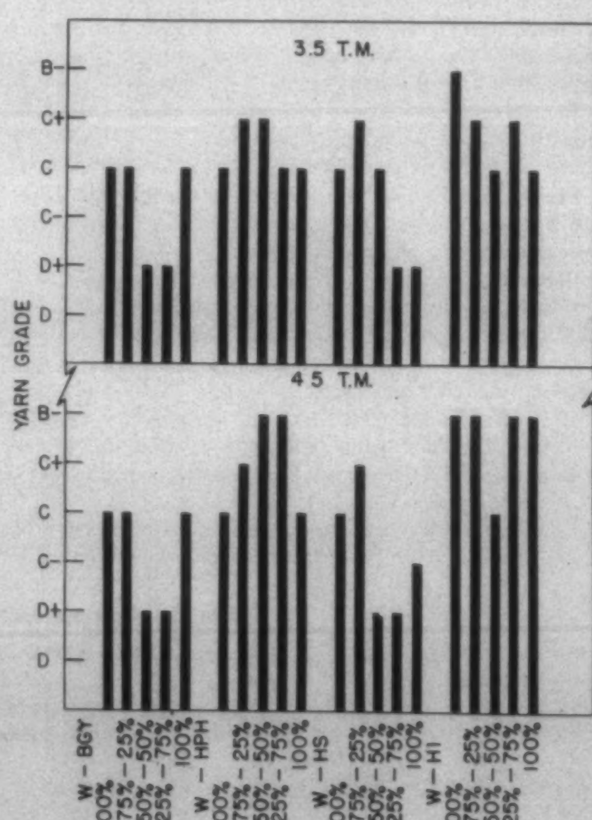

Fig. 6—Effect of blending four types of spotted with control cottons on yarn grade of a 36/1 (16 Tex) yarn.

and spotted cottons, knitted into jersey cloth, were subjected to various chemical treatments to try to eliminate differences in visual appearance. The following observations were made:

(1) Peroxide bleach eliminated all obvious differences in appearance except those between the HI and its control cotton. It eliminated noticeable visual appearance differences present in the greige between the HS cotton and its control.

(2) Hypochlorite bleach failed to eliminate differences between HI cotton and its control. It eliminated some but not all of the differences between the HS cotton and its control.

(3) Stripping with sodium hydrosulphite and ammonium hydroxide eliminated differences between the HI, BGY and HPH cottons and their controls, but did not eliminate differences between HS cotton and its control.

(4) Treatment with oxalic acid failed to eliminate differences between HI and HS cottons and their controls.

(5) A caustic soda boil eliminated differences between all spotted cottons and their controls except for the HI series. Part of the difference between the HI cotton and its control was eliminated.

(6) Mercerization was not effective in eliminating differences in appearance.

(7) Sodium perborate did not eliminate differences between HI cotton and its control.

Laboratory Experiment No. 2: A print cloth fabric with filling yarns spun from the spotted and control cottons was desized, scoured, stripped, bleached and vat dyed a brown shade using two concentrations of dyestuff on a small jig. After dyeing, no major differences in visual appearance were noted that might be attributable to the spotted cottons although the darker shade could conceivably have a less concealing effect than the light shade.

Procedures were as follows:

Desizing: Fabrics were desized at 170° F. for 2 hours with 0.25% (by vol.) Rhozyme DX and 0.10% (by vol.) Igepon T-51 and rinsed thoroughly.

Scouring: Fabrics were scoured for 2 hours at 200° F. with 2% (by vol.) sodium hydroxide and 0.10% (by vol.) Igepon T-51 and rinsed thoroughly.

Stripping: Fabrics were stripped 30 minutes at 212° F. with 5.0% (o.w.f.) sodium hydrosulphite and 1.0% sodium hydroxide (o.w.f.) and rinsed well.

Bleaching: Fabrics were bleached for 1½ hours at 200° F. with 3.0% (by vol.) hydrogen peroxide and 1.0% (by vol.) sodium silicate and rinsed thoroughly.

Dyeing: The dye bath was sprung at 190° F. with the following chemicals and dye:

5.0% dextrose (o.w.f.)
10.0% sodium hydroxide (o.w.f.)
1.0% and 5.0% Pensol Brown ARD (o.w.f.)
2.0% Igepon T-51 (o.w.f.)

The fabric was entered into the bath and dyed at 190° F. for 20 minutes; then 10% sodium hydrosulphite (o.w.f.) was added and dyeing continued for 30 minutes. The fabric was washed thoroughly and oxidized with 2.0% hydrogen peroxide (by vol.) starting cold and raising the temperature to 180° F. and then run 10 minutes, followed by a thorough rinsing. The fabric was then squeezed through a padder and dried on a tenter frame.

Laboratory Experiment No. 3: Filling yarns of the spotted and control cottons were woven into a narrow fabric in a filling sateen weave. A number of repeats of the pattern were woven. Fabrics were dyed a 0.25% shade of Chlorantine F. Blue 4 GL after the following pretreatments:

(1) no pretreatment;
(2) desized and scoured;
(3) desized, scoured and bleached;
(4) desized, scoured, bleached and mercerized;
(5) desized, scoured, bleached, mercerized and stripped with sodium hydrosulphite.

In the fabric having no pretreatment, the HI and HPH fillings dyed alike, being lighter in shade than the HS and BGY fillings which differed slightly in shade.

After desizing and scouring, the HS and BGY fillings dyed alike, the HPH filling was slightly lighter and the HI filling noticeably lighter.

After desizing, scouring and bleaching, the same general differences in shades persisted, but differences were less than after just desizing and scouring.

After desizing, scouring, bleaching and mercerizing, the HS, BGY and HPH fillings dyed alike, being a little darker in shade than the HI filling.

After desizing, scouring, bleaching, mercerizing and stripping, the HS, BGY and HPH fillings dyed alike with the HI filling still being lighter.

The above dyeing results correlated well with the moisture equilibrium value of the fiber at 92% relative humidity *(18)* as determined on roving samples, Table 1. Thus the moisture equilibrium value of 14.7% on the spotted HI sample was accompanied by a distinct tendency toward lighter dyeing than the BGY and HS samples, which had values of 16.3 and 16.6%, respectively.

Two additional sets of these fabrics were desized, scoured twice with caustic soda, followed by stripping with 10% (o.w.f.) sodium hydrosulphite (instead of 5% previously used). One set was bleached before dyeing and both sets were then dyed with 0.25% Chlorantine F. Blue 4 GL. In the set which was not bleached, the BGY filling dyed slightly darker than the HI, HS and HPH fillings, which dyed alike. In the set which was bleached, the differences in appearance were almost eliminated with the BGY filling being a trace darker than the other three.

A pastel shade in a bright color such as Blue 4 GL shows up any differences in cottons better than a darker shade such as the vat-dyed brown previously used in Experiment No. 2.

The fact that only very minute differences were apparent

Table 3—Commercial Finishing Procedure

FINISHING OPERATIONS				
Desizing	**Scouring**	**Bleaching**	**Mercerizing**	**Dyeing**
3% Acid Solution (50/50 HCl & H_2SO_4)	3.5% Solution—NaOH %0.5 Solution—Detergent	5%—35 Vol. H_2O_2 2.5% Sodium Silicate	18% Solution—NaOH 0.25% Wetting Agent	2% Vat (on Wt. of Fabric)
80° F.	212° F.	180° F.	80° F.	110-120° F.
1 Hour in J-Box	1 Hour in J-Box	1 Hour in J-Box	Continuous Multiple Wash Boxes	Continuous—Multiple Wash Boxes
Rinse	Rinse	Rinse and Dry	Dry	Dry

Table 4—Effect of Blending Four Types of Spotted with Control Cottons on the Strip Breaking Strength of Greige and Finished Fabrics*

COTTON	GREIGE		BLEACHED				BLEACHED, MERCERIZED AND DYED			
	Warp	Filling	Warp		Filling		Warp		Filling	
	lb.	lb.	lb.		lb.		lb.		lb.	
	1959	1959	1959	1960	1959	1960	1959	1960	1959	1960
BGY										
100% W	59.0	42.6	70.0	68.6	38.6	35.2	76.0	71.2	38.7	34.2
50%/50%	59.7	43.4	67.4	65.8	39.2	34.9	76.0	70.4	34.4	34.6
100% BGY	61.2	38.8	70.6	65.1	36.2	31.2	75.2	73.0	33.8	33.3
HPH										
100% W	61.5	42.3	70.4	66.5	40.5	35.9	74.3	73.1	36.0	37.1
50%/50%	61.4	41.0	71.0	69.2	37.6	33.7	73.8	75.6	34.5	35.4
100% HPH	61.2	40.3	72.1	67.4	37.8	34.6	75.7	71.9	36.4	32.7
HS										
100% W	62.1	37.6	72.6	66.8	38.7	33.0	69.8	71.7	33.9	32.4
50%/50%	62.8	35.9	75.6	70.6	32.2	29.9	76.4	72.3	32.1	31.8
100% HS	62.0	35.6	72.9	70.0	32.4	29.4	71.9	71.1	26.5	27.3
HI										
100% W	62.0	37.4	68.6	68.8	33.2	33.1	76.0	72.4	32.3	32.6
50%/50%	62.4	39.6	68.8	69.3	33.8	34.8	75.0	72.2	34.6	34.6
100% HI	61.3	41.4	66.8	69.0	36.3	36.2	74.8	73.5	35.0	35.5

*Results obtained about one year apart to test storage effects.

after dyeing with a pastel bright color is encouraging as these differences would probably disappear when dyed in darker shades. Also, the spotted cottons used were in the unblended form so that when smaller percentages of spotted cottons are blended with control cottons the differences would become less.

Another repeat of the pattern containing the same four spotted cottons was differentially dyed using 1.2% Diphenyl F. Red 5 BL and 2.8% Chlorantine F. Green BLL. Four distinct shades were obtained with HI and BGY fillings dyeing a redder and heavier shade than the HS and HPH spotted fillings.

Laboratory Experiment No. 4 (Commercial Finishing): A print cloth (80x80) in which the spotted cottons were used only as filling yarns was commercially finished using procedures given in Table 3. Bleached fabrics showed little difference between the spotted cottons and respective controls. Even in the HI series, where iron contamination was suspected, no serious defects were visible. In this case, however, latent effects may become apparent due to oxidizing and chemical reactions during storage.

The bleached, mercerized and dyed fabrics showed no serious defects from the spotted cottons in any of the series studied. Where evidence of "specks" existed, as in the case of the BGY series, this effect disappeared when blended with the control cotton in a 50/50 ratio.

Effects on Fabric Strength: Table 4 shows strip strength data for the greige and commercially finished fabrics for the four types of spotted cottons studied. There is no evidence that the spotted cottons affect adversely fabric strength when used as filling yarns. In spite of fairly large differences in yarn strength between the BGY and HS spotted cottons and their respective controls, the fabrics did not reflect this strength difference—probably due to the fact that the yarns were only used as filling with a common warp.

Strength determinations were made about one year apart to

Table 5—Mean Squares Indicating Significance of the Effects of Years, Replications and Blends on Strip Breaking Strength for Four Types of Spotted Cottons

Source of Variation	COTTONS							
	BGY		HPH		HS		HI	
	Warp	Filling	Warp	Filling	Warp	Filling	Warp	Filling
	BLEACHED							
Years (Y)	71.68	159.60	108.16	133.44*	182.25	120.63	7.65	.75
Replications (R) in Y	34.33**	57.76**	17.95*	7.20	38.88**	10.07	6.84	34.03*
Blends (B)	21.54*	43.85*	9.15	21.66	34.22**	95.43**	4.17	29.30*
B X Y	16.37*	1.78	6.62	1.44	6.34	9.91	3.35	1.25
B X R	8.22	19.07	5.87	2.38	1.86	22.64	6.09	9.45
B X R X Y	13.54	32.65*	9.77	19.82	8.81	5.50	6.28	3.16
Determinations (D) in B X R X Y	4.62	9.17	4.47	7.84	4.70	9.57	5.72	9.50
	BLEACHED, MERCERIZED AND DYED							
					***	***		
Years (Y)	158.76	22.72*	9.92	2.45	19.64	12.50	59.55	.67
Replications (R) in Y	16.47*	.71	1.48	1.91			10.62	1.17
Blends (B)	2.55	25.76	3.28	13.73	7.16	83.29**	.82	26.15
B X Y	10.00	18.80	23.13	22.52	3.57	1.13	4.40	.23
B X R	21.14*	.12	5.58	11.30			6.08	14.82
B X R X Y	1.38	1.39	1.20	6.96			10.71	34.82*
Determinations (D) in B X R X Y	4.77	9.17	7.41	8.35	12.67	7.27	6.04	8.12

*Significant at 95% Probability Level.
**Significant at 99% Probability Level.
***Analysis includes only one replication.

evaluate any deteriorating effects of the spotted cottons. Variance analyses of strip breaking strength data for all four types of cottons combined indicate that the effect of years is statistically significant for samples of the bleached fabrics tested in both the warp and filling directions and for samples of the bleached, mercerized and dyed fabrics tested in the warp direction. The effect of years is not statistically significant for samples of the bleached, mercerized and dyed fabrics tested in the filling direction. However, when each type of cotton was analyzed separately, the effect of years generally was not statistically significant, as indicated by Table 5. If a larger number of degrees of freedom had been available for testing years against replications in years in these separate analyses, significance would probably have been reached in many cases.

There appears to be no consistent trend toward a significant effect by blends for the four types of spotted cottons. However, "blends" of HS cotton was significant in the bleached samples tested in both directions and the bleached, mercerized and dyed samples tested in the filling direction. Also, "blends" of BGY was significant in the warp and filling directions for the bleached samples. The effect of replications in years was significant in five of the eight variance analyses of data for bleached fabrics indicating a considerable amount of variation due to location along the length of the fabric. This was true in only one of the eight analyses of bleached, mercerized and dyed fabrics.

Significance Of Results

The results obtained from the present investigation are admittedly limited in scope and should be accepted with obvious reservations associated with laboratory evaluations and use of only one bale each of the experimental cottons.

Light spotted cottons of the type used in this investigation apparently can be used successfully in blends with white cotton without impairing seriously either yarn or fabric properties in the greige state. Where doubt exists in using the light spotted cotton in the 100% form, blending it with white cotton in percentages of 25% will nullify any undesirable effects, provided that the blending techniques used are effectively controlled.

For finished materials, results of these preliminary experiments indicate that desizing, a double caustic boil-off, stripping with 10% sodium hydrosulphite and bleaching before dyeing are effective in eliminating color differences in the blends and types of spotted cottons investigated. The behavior of spotted cottons are admittedly very erratic and unpredictable so the conclusions are applicable only to the techniques and shades used in this investigation.

Knowledge of the geographical origin of spotted cottons must be known, since their characteristics and processing behavior are fairly reproducible from the same geographical areas. Spotted cottons should not be used indiscriminately and under no circumstances should the concept be accepted that all light spotted cottons process alike or are as good as white cottons.

Acknowledgments

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The Audomac system, mounted on overhead rails, moves up and down the bay over the spinning frames, with frame and floor cleaners cleaning as it travels. In addition to this lengthwise travel in the bay, the doffer itself travels widthwise over the frames on the crossbeams at the top. Thus, the doffer is positioned over any frame in the bay.

A Progress Report On The Whitin Audomac

WHITIN PUSHING FOR FIRST INSTALLATIONS BY THE END OF THE YEAR; 30 UNITS SOLD SO FAR

THE first installations of Audomac, the automatic system for doffing, monitoring and cleaning spinning frames developed by Deering Milliken Research Corp. (T.B. April '61, p. 60) and being built by Whitin Machine Works, are now expected by the end of this year, according to reports from Whitin.

Orders for 30 units, totaling about $2 million, are on hand; and several other orders by mills in both New England and the South are pending.

The April article in T.B., describing the doffer and how it works in text and photographs, was based on the operation of a prototype at Drayton Mills, Spartanburg, S. C. Since that time, the prototype has continued to operate and has now successfully doffed more than 5 million bobbins, the equivalent of more than 17,000 frames. The finished commercial model will be an improved and simplified version of the prototype, Whitin says.

While the name Audomac was coined to partially describe its functions of automatic doffing, monitoring and cleaning, the machine actually handles other functions as well. In the sequence of its automatic operation, it handles bobbin loading, selection, transportation, monitoring doffing, donning and cleaning. An entire frame of any length can be doffed in two minutes of down-time with fewer ends-down than is normal in manual doffing. It is anticipated that transportation of full bobbins, depending on mill layout, may be made directly to spooling or winding areas; and inasmuch as the bobbins may be removed from the frame and fed to the next process in the same order in which they were aligned on the spinning frames,

The automatic doffer doffs all spindles of a frame at one time. Here, full bobbins of yarn removed from the spindles are being lifted from the spinning frame and are ready for transfer to the unloading station. Empty bobbins have been placed in running position on the spindles and the spinning frame is ready for restarting.

there is potential for establishing improved quality control procedures.

Additional operation of the prototype has not changed the data on which the April article was based, but interested mill men have raised a number of questions about the adaptation and use of Audomac in their mills.

Here in question and answer form is the latest information available on the points most often raised.

What does an Audomac unit cost?

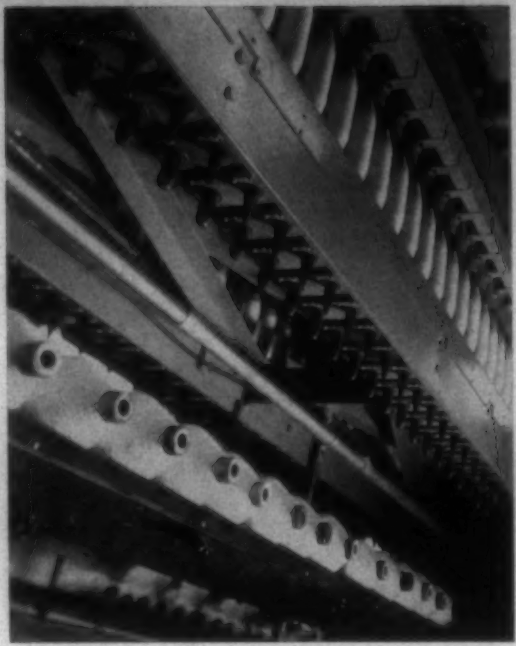
Best estimates by Whitin are that the price will be about $69,000 per unit, depending on the specifications for the installation. Firm pricing cannot be done until some of the units have been built on a commercial basis, and the cost is expected to drop as production reaches volume.

How long will it take a unit to pay for itself?

That depends on the particular installation and the degree of utilization of the unit. The prototype at Drayton serves 24 warp frames with 288 spindles each, a total of 6,912 spindles, spinning 40s yarn. It is estimated that this unit is utilized to only about one-third of its potential and could serve about 20,000 spindles. But on the 24 frames the return on the investment and the accompanying benefits are sufficient to have led Drayton to order four additional doffers to complete the installation in its five bays.

Basic data indicate that one unit can do the work of 2.5 manual doffers, or 7.5 doffers on a three-shift basis. This labor saving would amount to $20,000 to $25,000 a year in most mills.

More detailed accounting would bring in several other factors, among them the costs of: (a) a man to operate the Audomac; (b) the consumption of power (about 22 h.p.); and (c) maintenance of the unit.



Full bobbins *(top)* are now on the pin conveyor for removal to the collection point. Each bobbin is held upright by a hard-rubber peg similar to those seen on the underside of the conveyor. The pneumatic bobbin graspers that doffed the bobbins and lifted them to the conveyor are now out of the way at the top of the photo.

These added costs would have to be balanced against additional savings in: (1) automatic handling of empty bobbins; (2) elimination of manual-doffer training (estimated as costing, on average, about $1,500 a year for the doffers eliminated by the use of one Audomac); and (3) elimination of operat-

How The Audomac Works

THE AUDOMAC SYSTEM consists of two units—a stationary loading-and-unloading station and a traveling doffer-cleaner.

The loading-and-unloading station is essentially an arrangement for placing empty bobbins in position to be picked up by the doffer and for receiving full bobbins from the doffer.

At the entry end of the station, an empty-bobbin handling system monitors and selects empty bobbins and places them on hard-rubber pegs on a conveyor belt. These pegs are attached to the conveyor belt the same distance apart as the frame spindles and the bobbin graspers of the doffer.

In the case of the prototype at Drayton Mills, the two loading conveyor belts, one for each side of a frame, each have 144 empty bobbins in place, standing upright on the conveyor pegs, when the doffer picks them up. Another 144 empty pegs on each belt receive the full bobbins from a frame side.

The conveyor then passes them down to the end of a frame and drops the full bobbins into disposal chutes.

The doffer-cleaner is suspended from two crossbeams running on two overhead steel beams, one on either side of the frame bay. The crossbeams carrying the doffer-cleaner travel up and down the bay on these rails, with blowers cleaning the lines of frames and floor cleaners cleaning the alleys between frames.

The doffer itself travels crosswise on the crossbeams, and the whole assembly (doffer and crossbeams) travels on the lengthwise beams, making it possible for the doffer to service any frame in the bay.

Automatic signals co-ordinate the different actions of the loading-and-unloading station and the action of positioning the doffer over a frame to be doffed. The different actions of doffing are controlled through a push-button panel by an operator.

The sequence of basic actions is:

(1) The loading-station conveyor places empty bobbins in position for doffing.

(2) The automatic doffer picks up these bobbins in pneumatic graspers and moves to the frame to be doffed.

(3) A second rail of pneumatic graspers removes full bobbins from the spindles, a full frame at once.

(4) The empty bobbins are placed on the spindles, a full frame at once.

(5) The doffer moves back to the loading-and-unloading station and deposits the full bobbins on the proper conveyor pegs.

(6) The conveyor drops each bobbin individually into the disposal chutes.

The system requires one operator per unit. His job is to work the controls on the control panel for the doffing action, piece up ends, start the frames after doffing, and see that the whole system is working properly.

ing and maintenance costs of existing frame and floor cleaners.

Taken altogether, the savings in labor plus the less tangible benefits should permit an automatic doffer, if used at full potential, to pay for itself in about three years. Since conditions in most existing mills will not permit use at full potential, the payout may be slightly longer.

What factors lend themselves to the fullest utilization of this system?

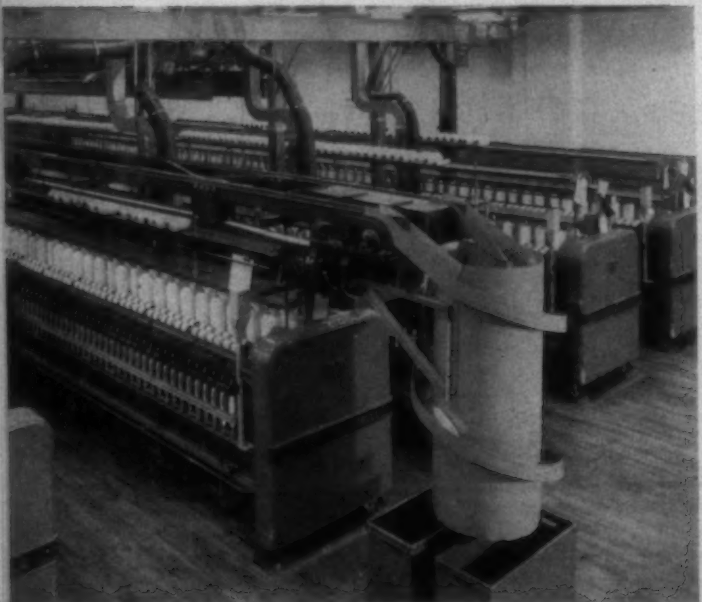
Efficiency of utilization depends on building construction plus operating conditions. The doffer serves one bay of frames. Thus, generally speaking, the longer the bay, the more frames served. However, doffs per bay per hour is perhaps a better criterion, as a doffer can also serve a short bay containing frames that are doffed frequently, as direct-filling-spinning frames producing coarse yarn numbers. Any bay that has about four doffs per hour or more should provide a good return on an investment in an automatic doffer.

How is the system fitted into existing mills with cluttered ceilings?

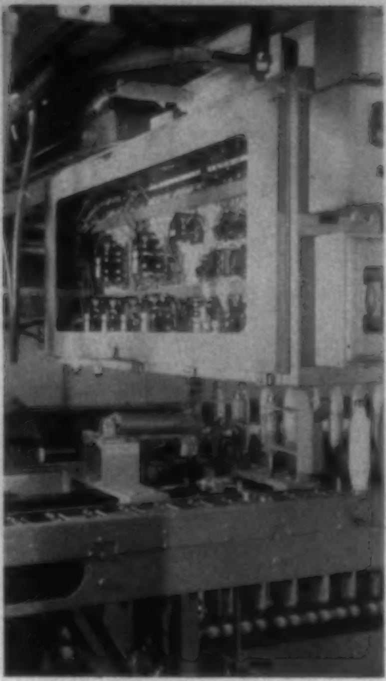
Frame and floor cleaners are mounted on the Audomac overhead carriage, eliminating present cleaner tracks. The head room required for the system is 35 inches, plus an inch or two of clearance for the doffer itself. The loading station, one for each doffer unit, may be installed either above a spinning frame or above a spare floor. Head room required is five inches plus the length of the bobbin used.

Therefore, the maximum clearance required occurs where the loading station is installed above a spinning frame and the doffer works above the loading station. In such a set-up, the headroom needed is 40 inches plus the length of the bobbin plus an inch or two of working clearance.

Even in mills where it may be necessary to raise lights and/or ducts to provide the necessary headroom return on the investment in the doffer is expected to make it profitable to do so.



Full bobbins of yarn doffed by Audomac and transferred from the loading station to belt conveyors are dropped into yarn boxes by these chutes. Alternate delivery might be to pinboards or to an extended conveyor system that would deliver the yarn to the next processing machine.



Controls for the operation of the system are standard switches, relays, starters, etc. commonly used in mills. Four photo cells, which plug in like radio tubes, are used on the bobbin sorter, an essential component in the Audomac system.

Are there any limitations as to yarn size or type or bobbin size or type?

No. The only requirement for the type of yarn is that the yarn will break when the full bobbin is lifted. The unit is not yet adapted to cut the yarn end, as would be necessary in the case of spooling.

Are the controls so complicated that they will require specially trained maintenance men or outside maintenance men?

Except for four photo cells used on the bobbin sorter, all controls are electrical and are no more complicated than present electrical starters, switches, relays, etc., now used on equipment throughout a mill.

The four photo cells on the bobbin sorter are mounted on bases that plug into receptacles like a radio tube or electrical extension cord. No maintenance is required. If a cell burns out, it is thrown away and a new one plugged in. Normal operating life is similar to the life of a radio tube or light bulb.

What is the significance of Audomac in monitoring or in quality control?

The unit monitors bobbins to prevent wrong bobbins or damaged bobbins from being fed to the spinning frame. The monitoring, by air jet, magnetic detectors, and limit switches, removes from the bobbin-handling system any bobbins not suited for the frames, telescoped bobbins, and bobbins with the ferrule pushed inside.

Since Audomac has control of each bobbin of yarn individually until it comes off the loading-station conveyor, it will be possible for a mill to set up a spinning quality-control system based on identifying any spindle making defective yarn. The use of pinboards, or other means, that would keep the bobbins under individual control and maintain spindle identity opens up the possibility of monitoring the quality produced by individual spindles and pinpointing troubles as they occur.

Comparison Of Weight Feeding And Conventional Volume Feeding Of Cotton In The Opening Room

TAKE YOUR CHOICE, SAY THE AUTHORS; THERE ARE NO APPRECIABLE DIFFERENCES IN THE END RESULT

By **WILLIAM T. WATERS and JOE PHILLIPS**
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BECAUSE of the variability of cotton's fiber properties and their effect upon performance and quality, mill men have long blended at opening and cleaning in an effort to reduce this variation. It is well known that an efficient blending program results in improved and more consistent running performance and yarn quality from day to day. Many mill men consider the terms blending and mixing to mean the same; however, those more intimately connected with the blending process believe them to be different. Mixing can be defined as a process in which known components are intermingled to produce a uniform distribution throughout a given lot, while blending has as its basis the measurement and proportioning of known components in a predetermined amount.

Not too many years ago, most mills blended entirely by grade, staple and locality. Today many have increased the factor of blending to include fineness, strength, color, short fiber content, irrigated or rain-grown, and flat or compressed bales. In addition some mills have started massive pre-blending programs in order to obtain more uniform raw material which is then fed to the opening line in the conventional manner. These newer blending techniques have resulted in improved and more consistent processing performance and yarn quality and in certain instances economic advantages where lower cost cotton is blended without appreciable effect on quality.

Today the use of four to six blending feeders with six to ten bales of cotton of known characteristics behind each hopper is considered to be the conventional method of blending. Recently the use of the Fiber Meter Blending System, which was originally designed for blending the more expensive man-made fibers where accurate blend percentages are necessary, has been applied to cotton.

Basically these two systems are similar with the main difference being that the Fiber Meter System feeds by a pre-set weight rather than by volume and that its feed conveyor is synchronized so that individual dumps from each weigh pan are formed into a sandwich layer. This feature overcomes a short-coming of the conventional system in which cottons of different densities (fineness, flat or compressed bale) will feed at different rates. Manufacturers of the Fiber Meter Automatic Blending System claim their system reduces ends-down in spinning, improves and reduces variation of yarn strength, and permits savings with the use of lower grade cotton and fewer personnel.

In comparing the merits of these two blending systems, one can readily see that the Fiber Meter system offers a more accurate and controlled method of blending. Since many mills are contemplating modification to or installation of Fiber Meter systems for blending cotton, a series of blending trials have been run in several mills to determine if the weight system offers appreciable improvements over the conventional system in spinning performance, yarn quality and variation of these properties. It should be noted that these trials were made to compare weight versus volume feed only and not techniques of blending, such as various proportions by fineness, staple, grade, etc. The results of these trials are limited to a certain extent in that they are not full scale mill tests; however, since the actual blending and making of laps were performed in the mill, significant differences should show up in laboratory processing trials.

Experimental Method

In an effort to compare the merits of Fiber Meter blending (weight system) with conventional blending feeders (volume system), trials were run in six mills having the Fiber Meter system. In addition, laps made from pre-blended stock and conventionally blended stock were obtained from another mill for evaluation. Four to six laps were made using the Fiber Meter system and then additional laps were made from the same mix and stock and on the same equipment with the weigh pans and conveyor apron control of the Fiber Meter system disconnected to simulate conventional blending. In a comparison such as this, the type mix, the condition and settings of the blending feeders, and the type and number of opening and cleaning machines can have an effect upon the results. In an effort to minimize these variables, trials were conducted in several mills which differed in the mix being run, blending techniques, and type of machinery used.

The various blending set-ups and equipment used in the trials are given in Table I. A schematic diagram of a typical organization is shown also in Fig. 1. These trials do not cover all aspects of cotton blending; however, it is believed that they provide a general coverage of blending techniques and

ABSTRACT

THROUGH THE CO-OPERATION of seven mills, a number of trials have been run comparing processing and spinning performance and yarn quality of stock blended by conventional blending feeders (volume feed), the Fiber Meter System (weight feed), and massive pre-blending. The actual blending and making of picker laps were conducted in the various mills and cover the more common blending techniques using factors of grade, staple, micronaire fineness, flat and compressed bales, and waste mixes. The results of these trials indicate that weight feeding and pre-blending offer only small improvements in spinning performance and yarn single strand strength over conventional volume feeding. Other properties such as fiber properties in picker lap and finisher drawing sliver, product evenness, count variation, yarn appearance, skein strength, color variation and dye affinity show no appreciable differences or consistent trends between blending methods.

*A report of work done under the Engineering Experiment Station, Auburn University, Auburn, Ala. Presented by Mr. Waters at the Fall meeting of the Textile Quality Control Association, Oct. 5-6, Greensboro, N. C.

E. M. Driscoll, Director of Technical Services, checks out a Uster evenness chart with Tom.

opening room equipment used today. Mills A and B are representative of a short staple set-up in which stock is blended by grade and micronaire fineness. They also afford a comparison of blending techniques since Mill A has a similar average micronaire fineness and grade behind each hopper while Mill B places different grades and ranges of micronaire fineness behind each hopper.

Two trials using 1-inch and $1\frac{1}{16}$-inch staple were run in which blending was made as to staple, grade, fineness, and flat or compressed bales. Trials at Mill G differed from the rest in that the stock was run on a conventional blending set-up and also on the Fiber Meter system in another opening room using the same bales. This set-up presents some variables, but since the other trials were conducted on the same equipment, it does offer a comparison of the two systems on different equipment. Mill F represents a more extreme blend of comber noils, flat strips and short staple. Mill D affords a comparison of massive pre-blending versus conventional blending using similar cotton and mix.

Laps run at the various mills were processed in the laboratory under controlled conditions and on conventional equipment into several hank rovings and yarn sizes for comparison of performance and quality between blending methods. In most cases similar roving and yarn sizes and yarn twists to those of the mill in which the trial was conducted were used in order to make the results more useful to the mill concerned. Evaluation of spinning performance consisted of a conventional ends-down per 1,000 spindle hours test on a Whitin Piedmont frame (240 spindles) and an accelerated spinning potential (spinnable limit) test (1) on a Roberts M-1 frame. The ends-down test consisted of approximately 2,000 to 3,000 spindle hours for the coarser counts and 4,000 to 5,000 spindle hours for the finer counts. All processing was conducted at 58% relative humidity.

Physical tests were conducted at standard A.S.T.M. conditions using recommended A.S.T.M. test methods. Fiber tests were made on both picker lap stock and finisher drawing sliver and consisted of micronaire fineness, fiber length properties (Suter Webb and Servo Fibrograph) and Pressley strength. Evaluation of processing performance and quality consisted of measurement of card web neps and evenness of card sliver, drawing sliver, roving and yarn. Evaluation of yarn quality consisted of evenness, skein and single strand strength, elongation at break, yarn appearance, color variation, and dye affinity. Since one measure of blending efficiency is the variation of properties, standard deviations were calculated for most results.

Fig. 1—Schematic Diagram of Opening, Cleaning and Picking Organization in Mill E Blending Trial

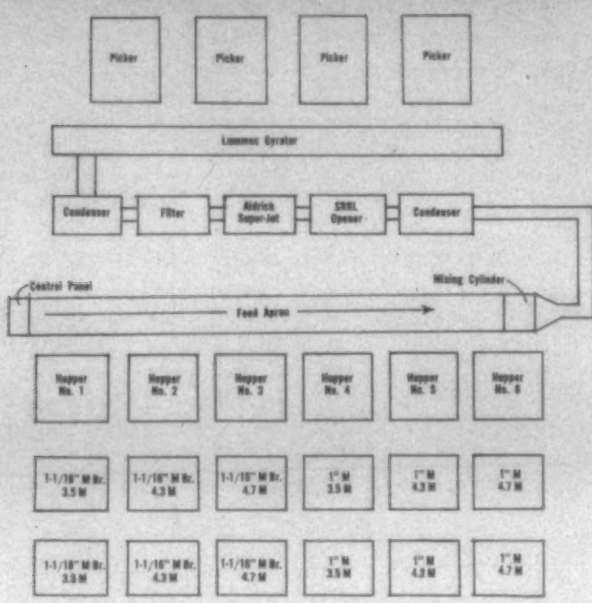

Table I. Blending Set-Ups And Equipment Used In Making Laps For Trial

Mill	Mix & Technique of Blending	Opening & Cleaning Equipment
A	25 bale mix, compressed bales, 15/16 in. staple, SLM to SLM Sp grades, 2.8 to 4.2 micronaire, 6 hoppers and waste hopper, average grade and micronaire behind each hopper.	Fiber Meter System, Superior, S.L. No. 11/No. 12, S.L. No. 11, Superior, Picker.
B	40 bale mix, flat bales, 15/16 in. staple, 25% M and 75% M Sp grades, 3.4 to 4.6 micronaire, 5 hoppers, 3 hoppers medium fineness (3.9-4.2), 1 hopper fine (3.4-3.8), 1 hopper coarse (4.2+), micronaire range behind each hopper.	Fiber Meter System, Superior, Whitin Axi-Flow, S.L. No. 11/No. 12, Picker.
C	3 bale mix, flat bales, 1-1/16 in. staple; Middling grade, 4.1, 4.2 and 4.3 micronaire, one bale behind each hopper.	Fiber Meter System, Superior, Whitin Axi-Flow, S.L. No. 11/No. 12, Picker.
D	Massive pre-blended (100 bale mix each bale) versus massive gin bale mix (100 bales), 50% M Br and 50% SLM, 1-3/32 in. staple, irrigated Acala 4-42.	
E	12 bale mix, 50% 1-1/16 in. M Br flat bales, 50% 1 in., M, compressed bales, 6 hoppers, 2 bales each of 3.5, 4.3, 4.7 micronaire for each staple (See Fig. 1).	Fiber Control System, SRRL Opener, Aldrich Super-Jet, Picker.
F	72 bale mix, blend of comber noils, flat strips and 15/16 in. M staple.	Fiber Meter System, Superior, Vertical Opener, S.L. No. 11/No. 14, 2 beater picker, 2 beater picker.
G	11 bale mix, 1-1/16 in. 50% M and 50% SLM, 3.0 to 4.8 micronaire range.	**Conventional** — Blending Feeders (11), Superior Cleaner, Axi-Flow and No. 11 Condenser. **Fiber Meter System**—(11 Feeder units) Axi-Flow and No. 11 Condenser.

Results And Discussion

Blending trials were conducted in six mills to compare the blending efficiency of conventional blending feeders with

Fiber Meter system and in one mill to compare pre-blended stock with conventionally blended stock. Processing evaluation of picker laps from these trials were made in the laboratory and consisted of a comparison of processing and spinning performance, yarn quality and variation of these properties. The results of these trials are given in Tables II through V.

Fiber Properties

In order to compare relative blending efficiency of the two systems, the more common fiber properties were measured from picker lap and finisher drawing sliver stock and the variation of results calculated (see Tables II and III). In general very little difference in the fiber properties measured and the variation of these properties is seen between the two systems. The small differences found are not consistent for either system, and it appears that from a comparison of fiber properties and variation of these properties after blending there is no appreciable difference in the blending efficiency between blending methods.

Processing And Spinning Performance

Comparisons of card web neps and evenness of sliver and roving between blending methods are given in Table IV. It is apparent from these results that differences in processing quality between the blending systems are small and the trends in both actual property and variation of this property not consistent.

It is realized that spinning variables such as yarn size, twist and spindle speed have considerable influence upon spinning performance; however, it is believed that the comparisons made using different spinning variables will be more beneficial in determining if one blending method shows consistent merit. A comparison of ends-down and spinnable limit results obtained for the various samples is shown in Table IV *(on Page 62)*.

Ends-down results show no appreciable or consistent difference in spinning performance between the two blending methods for the shorter staples and coarser yarns but do indicate a slightly better spinning performance for the Fiber Meter system with $1\frac{1}{32}$-inch and $1\frac{1}{16}$-inch staples in finer yarns. Adequate stock was run at Mill E for replicate trials.

Since ends-down at a traveler speed of 5,500 ft./min. were low and the difference between blending methods small, a higher traveler speed of 6,775 ft./min. was used in replicate 2. At the higher speed the difference in ends-down was greater. Similar trends are also noticed for pre-blended cotton and for spinnable limit. Mill G conducted trials in its mill and found no significant difference in ends-down between conventional blending and Fiber Meter blending.

Yarn Quality

A comparison of yarn properties for the different blending methods is given in Table V. These results show no appreciable or consistent difference in yarn appearance, evenness and count variation between yarns of the various blending methods. The most consistent trend appears to be in the slightly higher single strand strength of yarns from pre-blending and the Fiber Meter system; however, the skein strength differences

Table II. Fiber Properties From Picker Laps In Blending Trials

	MILL A		MILL B		MILL C		MILL D		MILL E 1st Replicate		MILL E 2nd Replicate		MILL F		MILL G	
Property:	Conv.	F.M.	Conv.	F.M.	Conv.	F.M.	Conv.	Pre-Blended	Conv.	F.M.	Conv.	F.M.	Conv.	F.M.	Conv.	F.M.
Classification																
Length (in.)	7/8 and 15/16		15/16		1-1/16		1-3/32		1 & 1-1/16		1 & 1-1/16		15/16 M Staple		1-1/16	
Grade	SLM Lt Sp & SLM SP		M & M Sp		M		M Br & SLM		M & M Br		M & M Br		Comber Noils, Flat Strips		M & SLM	
Servo-Fibrograph Length																
U.H.M. (in.)	0.90	0.88	0.90	0.89	1.01	1.00	1.04	1.04	0.95	0.94	0.95	0.95	0.91	0.90	1.06	1.08
M.L. (in.)	0.66	0.64	0.65	0.65	0.74	0.74	0.80	0.79	0.68	0.67	0.69	0.70	0.63	0.63	0.77	0.81
U.R. (%)	73	73	72	73	73	74	77	76	71	71	73	74	69	70	73	75
Short Fiber Index (%)	19.8	20.6	18.9	18.8	12.9	10.4	7.3	8.4	14.7	14.3	16.9	13.7	20.4	18.5	11.6	12.8
Suter-Webb Length																
U.Q.L. (in.)	0.93	0.92	0.95	0.95	1.09	1.09	1.11	1.15	1.01	1.00	1.04	1.01	0.93	0.94	1.05	1.06
M.L. (in.)	0.70	0.68	0.71	0.72	0.84	0.85	0.88	0.90	0.78	0.76	0.78	0.78	0.64	0.65	0.82	0.84
C.V. (%)	43	46	43	42	38	38	37	34	39	41	41	40	54	54	36	36
Short Fiber Content (%)																
½" and shorter	25.8	27.4	24.9	24.3	16.5	16.7	14.4	13.3	20.4	21.9	20.8	19.5	36.2	35.6	17.2	15.8
⅜" and shorter	17.6	19.9	17.1	16.7	12.7	12.1	10.3	9.5	13.7	13.8	14.4	14.1	27.9	26.0	11.8	11.0
Micronaire Reading	3.3	3.3	3.8	3.8	4.1	4.0	4.2	4.3	3.8	4.0	3.9	4.0	3.8	3.8	4.3	4.1
	(0.06)	(0.07)	(0.07)	(0.14)	(0.08)	(0.05)	(0.07)	(0.06)	(0.08)	(0.07)	(0.07)	(0.10)	(0.09)	(0.12)	(0.07)	(0.07)
Pressley Strength 0" gauge; 1,000 p.s.i.	78.9	77.9	79.0	82.6	88.0	83.7	93.5	93.8	79.5	78.4	82.2	78.3	78.1	77.3	79.4	79.5
	(2.7)	(4.6)	(2.9)	(1.6)	(2.9)	(1.5)	(2.8)	(3.4)	(2.1)	(4.1)	(3.4)	(2.1)	(2.7)	(3.7)	(3.3)	(3.8)

Note: Figure in parenthesis is standard deviation of individual results.

Table III. Fiber Properties From Finisher Drawing Sliver In Blending Trials

	MILL A		MILL B		MILL C		MILL D		MILL E 1st Replicate		MILL E 2nd Replicate		MILL F		MILL G	
Property:	Conv.	F.M.	Conv.	F.M.	Conv.	F.M.	Conv.	Pre-Blended	Conv.	F.M.	Conv.	F.M.	Conv.	F.M.	Conv.	F.M.
Servo-Fibrograph Length																
U.H.M. (in.)	0.90	0.92	0.94	0.91	1.02	1.03	1.08	1.07	0.98	0.98	0.97	0.97	0.92	0.93	1.09	1.12
M.L. (in.)	0.69	0.69	0.71	0.68	0.79	0.80	0.89	0.82	0.73	0.75	0.74	0.73	0.65	0.67	0.82	0.85
U.R. (%)	77	75	76	75	77	78	83	78	74	76	76	76	71	72	75	76
Short Fiber Index (%)	17.0	16.1	15.4	14.1	9.7	8.1	3.7	7.0	11.3	11.7	12.5	10.6	19.1	16.8	12.5	12.4
Suter-Webb Length																
U.Q.L. (in.)	0.95	0.96	0.98	0.97	1.12	1.12	1.15	1.14	1.03	1.02	1.00	1.02	0.95	0.95	1.06	1.08
M.L. (in.)	0.73	0.74	0.78	0.76	0.89	0.90	0.95	0.93	0.81	0.80	0.78	0.81	0.68	0.70	0.83	0.87
C.V. (%)	41	39	36	38	36	33	29	32	36	37	38	36	47	45	36	33
Short Fiber Content (%)																
½" and shorter	23.0	19.8	15.8	19.3	14.9	13.0	8.9	11.7	16.7	18.3	17.9	16.3	29.9	27.8	16.6	13.2
⅜" and shorter	15.1	13.5	10.6	13.1	10.4	7.9	6.0	8.2	11.2	11.9	11.8	10.6	23.7	17.7	10.9	8.5
Micronaire Reading	3.4	3.3	3.9	3.8	4.0	4.1	4.2	4.3	3.9	4.0	4.0	3.9	3.9	4.0	4.3	4.2
	(0.08)	(0.09)	(0.09)	(0.09)	(0.14)	(0.07)	(0.06)	(0.13)	(0.07)	(0.10)	(0.06)	(0.10)	(0.12)	(0.13)	(0.08)	(0.08)
Pressley Strength ⅛" gauge, P.I.	2.95	2.93	2.97	3.09	3.42	3.39	3.83	3.94	3.13	3.10	3.12	3.11	3.16	2.97	2.95	3.00
	(0.13)	(0.08)	(0.14)	(0.07)	(0.12)	(0.10)	(0.16)	(0.16)	(0.16)	(0.14)	(0.08)	(0.14)	(0.14)	(0.20)	(0.02)	(0.12)

Note: Figure in parenthesis is standard deviation of individual results.

are smaller and not consistent. Consistent and lower variation of results was not found for the Fiber Meter and pre-blended system as might be expected. In mill scale trials at Mill G, a similar trend of slightly higher single strand strength was found for the Fiber Meter system.

Yarns from each trial were wound on cones and knitted into panels for evaluation of color variation and dye affinity. No appreciable differences in either of these properties were found between yarns blended by the different methods.

Discussion

In studying the basic principles in feeding by volume, in which the feed rate is subject to variation due to density differences and machine settings, and feeding by the Fiber Meter weight system, which is more accurate and consistent in its feeding; one might logically conclude that the Fiber Meter system should be superior. However, the results of these trials have consistently shown differences between the two systems to be small and the Fiber Meter system only slightly superior in spinning performance and single strand strength for finer yarns. In addition it would be expected that the Fiber Meter system should give consistently lower variations of results, but this was not found.

At the beginning of this work, plans were to run trials in only three mills; however, due to the small differences found in these earlier tests, additional trials were run where available and where more extreme cottons were being blended. The waste mix yarn trial at Mill G would be considered an extreme blend, yet the improvements derived from the Fiber Meter system were small.

In view of the results obtained and the logical, superior principle of the Fiber Meter, one asks why the improvements are not greater. It is believed that the main reason for this discrepancy is due to the variability of cotton's fiber properties and the lack of fast, accurate means of measuring and blending by the more important properties and to the apparently adequate mixing after blending feeders.

Since we do not at present have adequate instruments for rapid, accurate and representative measurement of fiber properties for each bale—such as short fiber content, fiber damage and other important fiber properties which have a large effect upon spinning performance and yarn quality—it is conceivable that we are comparing two methods of mixing rather than blending and that mixing in subsequent processes is adequate. If one were able to obtain fast and reliable measures of the necessary fiber properties for each bale and then blend by a predetermined amount on a Fiber Meter system, it is highly conceivable that much larger and consistent improvements in performance and quality would be had.

Conclusions

The findings of these trials should be accepted and used with the understanding that they were obtained on small samples of approximately 250 to 300 pounds of picker lap.

Table IV. Comparison Of Processing Performance Of Stock Blended By Conventional Method And Fiber Meter System

Property:	MILL A Conv.	MILL A F.M.	MILL B Conv.	MILL B F.M.	MILL C Conv.	MILL C F.M.	MILL D Conv.	MILL D Pre-Blended
Neps/100 sq. in. of Card Web*	14 (2.7)	14 (2.0)	12 (2.6)	13 (2.5)	5 (0.0)	5 (0.0)	5 (0.0)	5 (0.0)
Uster Evenness (% C.V.)								
Card Sliver	65 gr./yd.				55 gr./yd.			
	3.9 (0.06)	3.0 (0.8)	3.2 (0.4)	3.1 (0.5)	3.8 (1.0)	3.6 (0.6)	3.3 (0.4)	3.4 (0.6)
Finishing Drawing Sliver	70 gr./yd.				55 gr./yd.			
	3.3 (0.3)	4.3 (0.6)	4.6 (0.9)	4.5 (0.5)	4.0 (0.2)	3.7 (0.1)	4.1 (0.4)	3.7 (0.3)
Roving	1.00 H.R.				1.00 H.R.			
	9.1 (0.5)	8.4 (0.6)	8.8 (0.5)	9.6 (0.4)	7.8 (0.5)	7.0 (0.5)	7.9 (0.8)	8.1 (0.8)
	1.50 H.R.				2.00 H.R.			
	10.6 (0.4)	9.5 (0.6)	10.1 (0.6)	10.5 (0.9)	9.2 (0.6)	9.3 (0.6)	9.0 (0.6)	7.9 (0.5)
Spinning Performance Ends Down/1,000 Spindle Hours**	20/1, 4.90 T.M., 5,500 ft./min.***				28/1, 4.50 T.M., 5,500 ft./min.			
	22	16	13	21	36	34	24	13
Spinnable Limit (Yarn No.) 5,500 ft./min.	4.00 T.M.				3.50 T.M.		3.25 T.M.	
	42	39	39	39	50	52	51	52
	5.00 T.M.				4.50 T.M.		4.00 T.M.	
	43	42	41	41	62	63	72	73

* Metallic Clothing, Mills A & B—10 lbs./hr.; Mills C & D 9 lbs./hr.
** Based on approximately 5,000 spindle hours.
*** Traveler Speed
Note: Figure in parenthesis is standard deviation of individual results.

Table IV. Continued

Property:	MILL E 1st Replicate Conv.	MILL E 1st Replicate F.M.	MILL E 2nd Replicate Conv.	MILL E 2nd Replicate F.M.	MILL F Conv.	MILL F F.M.	MILL G Conv.	MILL G F.M.
Neps/100 sq. in. of Card Web*	5 (1.2)	6 (1.6)	5 (1.2)	5 (1.2)	57 (6.3)	58 (5.5)	26 (3.9)	23 (5.1)
Uster Evenness (% C.V.)								
Card Sliver	55 gr./yd.				70 gr./yd.		55 gr./yd.	
	3.4 (0.7)	3.2 (0.4)	3.7 (0.5)	3.2 (0.2)	3.8 (0.5)	4.2 (0.8)	5.3 (0.5)	5.3 (0.7)
Finisher Drawing Sliver	55 gr./yd.				70 gr./yd.		55 gr./yd.	
	4.4 (0.2)	4.5 (0.2)	4.0 (0.1)	4.6 (0.2)	5.4 (0.1)	5.3 (0.2)	3.9 (0.4)	3.9 (0.4)
Roving	1.00 H.R.				0.75 H.R.		1.00 H.R.	
	7.4 (0.7)	8.0 (0.4)	7.6 (0.6)	7.7 (0.3)	8.8 (0.5)	9.0 (0.5)	7.6 (0.5)	8.1 (0.7)
	2.00 H.R.						2.00 H.R.	
	8.9 (0.5)	9.7 (0.6)	9.2 (0.5)	9.7 (0.3)			8.8 (0.5)	8.9 (0.5)
Spinning Performance Ends Down/1,000 Spindle Hours**	30/1, 4.50 T.M., 5,500 ft./min.***		30/1, 4.50 T.M., 6,775 ft./min.		8.6/1, 3.60 T.M., 4,400 ft./min.		30/1, 4.50 T.M., 6,175 ft./min.	
	16	14	40	30	129	106	27	27
Spinnable Limit (Yarn No.) 5,500 ft./min.								
3.50 TM	37	36	37	36	—	—	46	48
4.50 TM	55	55	55	57	—	—	58	60

* Metallic Clothing, Mills E & G—9 lbs./hr.; Mill F—12 lbs./hr.
** Based on approximately 5,000 spindle hours.
*** Traveler Speed
Note: Figure in parenthesis is standard deviation of individual results.

Table V. Comparison Of Properties Between Yarns Spun From Conventional And Fiber Meter Blended Stock

	MILL A		MILL B		MILL C		MILL D		MILL E 1st Replicate		MILL E 2nd Replicate		MILL F		MILL G	
Property:	Conv.	F.M.	Conv.	F.M.	Conv.	F.M.	Conv.	Pre-Blended	Conv.	F.M.	Conv.	F.M.	Conv.	F.M.	Conv.	F.M.
Uster Evenness (% C.V.)	22.4	22.7	23.9	22.8	21.0	19.8	21.6	19.7	22.1	22.4	21.5	22.1	21.7	21.8	23.4	22.5
	(0.8)	(1.2)	(1.0)	(1.7)	(0.6)	(0.8)	(1.0)	(0.9)	(0.9)	(1.1)	(0.8)	(0.8)	(0.9)	(0.8)	(1.0)	(1.1)
Count	19.6	20.5	19.6	19.5	27.1	27.4	28.0	27.5	30.3	30.1	29.2	29.3	8.6	8.6	29.5	29.8
	(0.5)	(0.3)	(0.5)	(0.4)	(0.3)	(0.6)	(0.5)	(0.5)	(0.7)	(0.4)	(0.6)	(0.5)	(0.2)	(0.03)	(0.6)	(0.5)
Tensile Strength Skein (lbs.)	103	109	108	103	89	85	104	103	65	66	66	72	193	203	68	74
	(6.2)	(4.1)	(5.9)	(4.3)	(2.7)	(4.5)	(2.5)	(3.1)	(4.7)	(2.8)	(2.8)	(2.5)	(9.0)	(11.0)	(3.3)	(2.7)
Skein Break Factor (lbs. x count)	2019	2234	2117	2008	2412	2329	2912	2832	1970	1987	2026	2110	1660	1746	2006	2205
Single Strand (gms)	397	392	386	394	316	311	359	377	248	250	256	262	657	711	261	266
	(50)	(47)	(46)	(44)	(30)	(37)	(39)	(37)	(31)	(26)	(34)	(34)	(96)	(94)	(26)	(28)
Single Strand Break Factor (oz. x count)	274	285	267	271	304	301	356	366	267	266	263	272	200	216	271	280
Elongation at Break (%) Single Strand	8.0	7.5	7.9	7.6	7.0	6.7	7.1	7.3	6.0	5.9	5.9	6.0	7.2	7.2	6.5	6.5
Yarn Appearance Grade	B	C+	B	B	B+	B+	B+	B+	B	B	B	B+	D	D	C+	C+

Note: Figure in parenthesis is standard deviation of individual results.

The results of this investigation indicate the following conclusions:

(1) Based on measurements of fiber properties in picker lap and finisher drawing sliver, the Fiber Meter system and pre-blended stock do not show appreciable improvements over conventional blending feeders in blending efficiency.

(2) Stock blended by conventional feeders is similar in processing performance and quality through roving to that blended by the Fiber Meter system and the pre-blended method.

(3) Fiber Meter and pre-blended stock show no appreciable improvement over conventionally blended stock in spinning performance for short staple and coarse yarns but do result in slightly better spinning performance when using $1\frac{1}{32}$-inch and $1\frac{1}{16}$-inch cotton and spinning into finer yarns.

(4) Yarn spun from stock which has been pre-blended or blended on the Fiber Meter system shows slightly higher single strand strength than conventionally blended yarn but is not appreciably different in evenness, appearance, strength variation, color variation and dye affinity.

Acknowledgments

The authors are greatly indebted to the various mills and their personnel for making these blending trials possible. Appreciation is also expressed to the following members of the Auburn University School of Textile Technology: Clyde Pryor, Robert Putnam and William Register for the processing of samples; Lila Putnam and Greta Tatum for the measurement of fiber and yarn physical properties.

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Second Quarter Tire Cord Production Up 17% Over Second Quarter Of 1960

Production of tire cord and tire fabric during second quarter 1961 was 97,262 thousand pounds, according to the Bureau of the Census. This was 1% above the previous quarter and 17% below the comparable period of last year.

Output of rayon tire cord and tire cord fabric decreased 20% from the previous quarter's level to 45,303 thousand pounds. During the same period the production of nylon tire cord and tire cord fabric increased 41% to 43,046 thousand pounds.

Stocks of tire cord and tire cord fabric on July 1, 1961, were 41,867 thousand pounds, or 4% above the April 1, 1961, level and 17% less than the stocks on July 2, 1960.

Production Of Tire Cord And Tire Fabric
(Thousands of Pounds)

Type of Goods	Looms Operating July 1, 1961	Production April-June 1961
Tire Cord and Tire Fabrics, All Fibers, Total	1,840	97,262
Man-made fiber tire cord and tire fabrics	1,185	91,096
Rayon tire cord and tire cord fabric	310	45,303
Tire cord, not woven	—	45,303
Tire cord fabric, woven	310	45,303
Nylon tire cord and tire cord fabric	497	43,046
Chafer fabrics and all other tire fabrics	378	2,747
Cotton tire cord and tire fabrics	655	6,166
Tire cord and tire cord fabrics	26	893
Chafer fabrics and all other tire fabrics	629	5,273

Second Quarter Profits Up Over First Quarter But Still Lag Behind Last Year

Profits of manufacturers of textile mill products jumped from $36 million in the first quarter of 1961 to $60 million in the second quarter but still lagged behind the $86 million reported for second quarter 1960.

The figures, contained in a report issued jointly by the Securities and Exchange Commission and the Federal Trade Commission, cite profits of $14 million for producers of apparel and other finished products, up from $11 million during the first quarter but behind the $33 million of second quarter 1960.

Total sales of producers of textile mill products amounted to $3.3 billion during the period as compared with $3.02 billion in the first period and $3.4 billion in the second quarter last year.

Sales of apparel and other finished products totaled $1.9 billion, dropping from $2.8 billion during the first quarter and the $2.6 billion in second quarter 1960.

Dixon Corp.: A New Plant In A New Town

AN OLD FIRM WITH A NEW OUTLOOK, DIXON CORP. HAS CHANGED ABOUT EVERYTHING BUT ITS NAME

VIRTUALLY settled now in its new quarters at Monroe, N. C., the Dixon Corp. can look back with a sigh of relief at the hectic activity of the past eight months. In that time the company has done about everything but change its name. Biggest of the changes was the transfer of its textile machinery, sales and engineering divisions to Monroe from Bristol, R. I., and Charlotte. Also involved was the organization of its own sales facilities since Dixon products were formerly offered through manufacturers agents.

The transformation hasn't been easy, but coupled with a lull in demand for changeovers during first-half 1961, it came off rather smoothly, and production is being accelerated now toward full operation. Last year was the third best in Dixon's 85-year history, and 1962 promises to be far more active than this year.

The new plant, however, is preparation for more than just increased activity in the changeover field. They will still be the company's chief offering, but further diversification will lead Dixon into other accessory lines as well. A number of new developments are already under consideration, with several of them now advanced to testing stages.

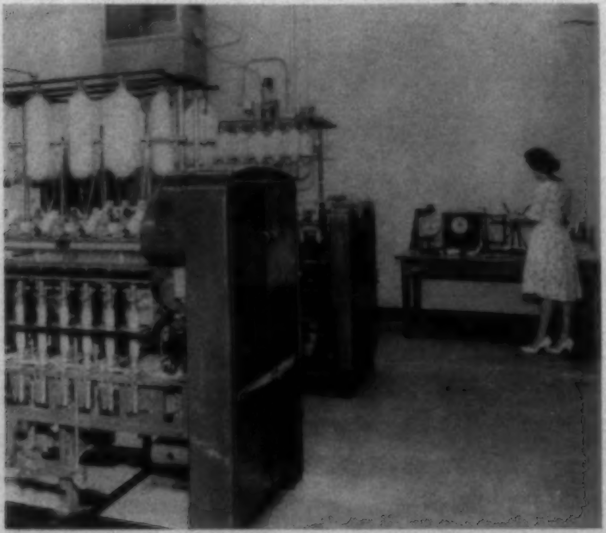
Stafford, Miller

Gilbert S. Stafford, engineering manager, and Robert R. Miller, president, are responsible for several of the firsts scored by the company during the past ten years.

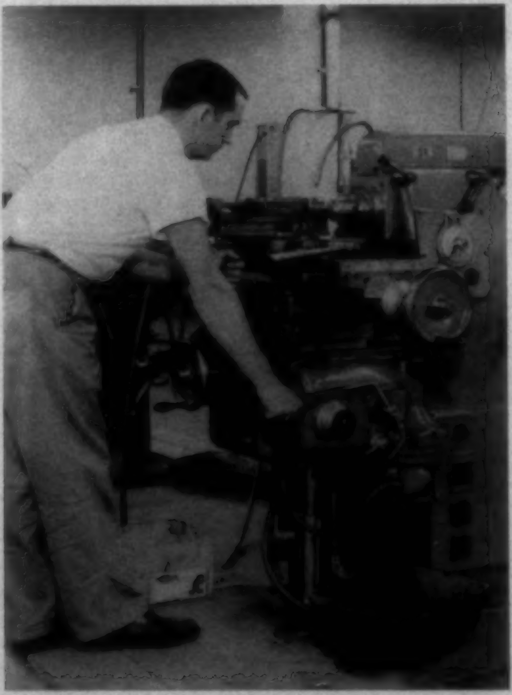
Why The Transfer?

In announcing plans last January for the transfer of its textile division, Robert Rulon Miller, Dixon president, cited these reasons: (1) to be nearer Southern mills and thus effect better deliveries and service; (2) to get away from New England's unsatisfactory weather conditions; (3) a hope for increased productivity from employees; (4) lower building costs; and (5) a desire to become a factor in the rapid industrial growth of the Southeast.

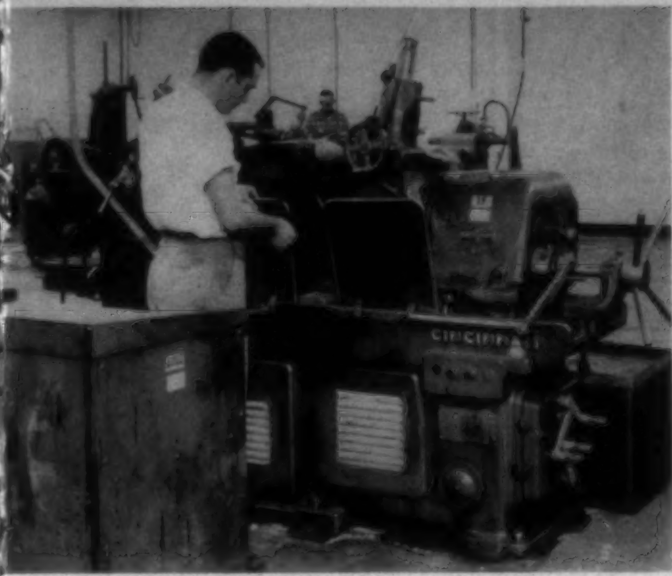
Significantly no mention was made of tax inducements, free plant sites, cheaper labor and any of the other reasons often cited for transfer of operations from North to South. Dixon sought no such concessions and actually declined to consider



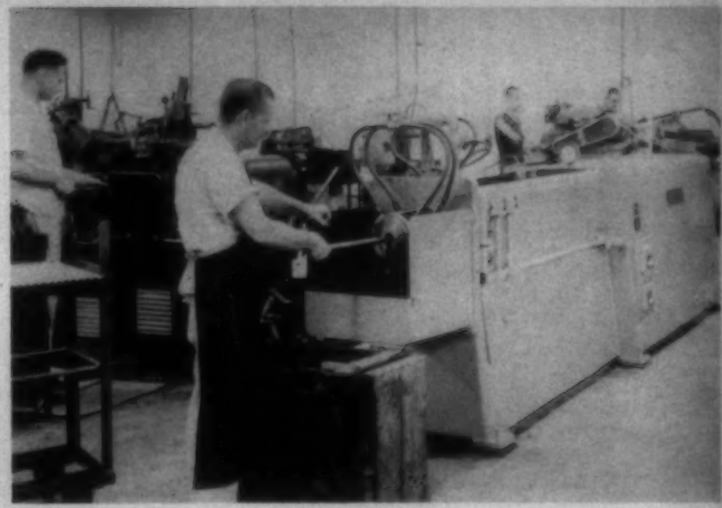
Dixon's new spinning laboratory is a 900 square-foot, completely air-conditioned room with two experimental frames for changeovers and equipment for measuring yarn properties.



Milling machines such as this Varnamo VMA Type UB-1 are capable of producing some 300 parts per hour.



Dixon is equipped with several grinding machines for grinding tapers and overall and inner diameters on the steel rolls.



This LaPointe machine broaches the flutes on steel rolls. In one operation, it is capable of broaching up to eight fluted sections.

them when they were offered by other communities interested in landing the Dixon plant.

A Look At The Plant

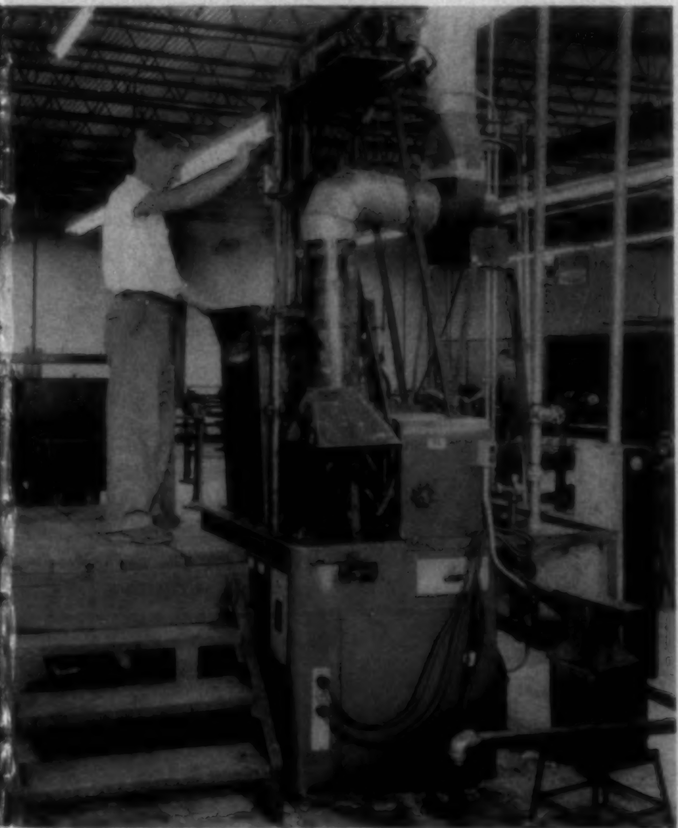
Very striking in appearance, the new one-story plant is of brick and concrete construction with modern low lines and simple architecture. Spacious shop and storage areas will permit gradual expansion at a minimum of cost. An air-conditioned spinning lab, equipped with two experimental spinning frames and a variety of yarn testing equipment, serves as a testing facility for production units and as a workshop for research and development.

Shop facilities are more than adequate, with equipment ranging from turret lathes to paint sprays. Included are drill presses, milling machines, a broaching machine, screw machines, etc. Most of the equipment has been transferred to Monroe from shop facilities previously maintained at Bristol and Charlotte. Some of the units are new and represent a portion of a sizeable expenditure Dixon is making to modernize and complete its shop facilities.

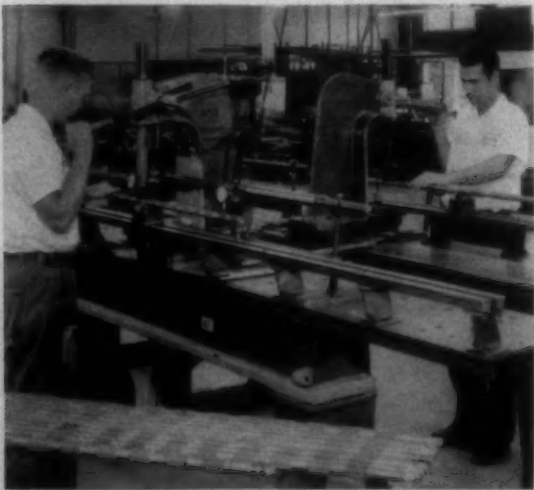
An Impressive History

The Dixon Corp. has made a number of significant contributions to the textile machinery field since its founding by Ezra Dixon in 1876 in Rhode Island. The company was formed to produce spinning frame saddles, and company legend has it that at one time every spinning frame in the world was equipped with the patented Dixon saddle. The patents ran out in the '20s but the saddles remained as the number one product until after World War II.

Interest in spinning changeovers reached new peaks after



Induction hardening and annealing of steel rolls gives them longer life and sets up fewer stresses than case hardening.



Bottom rolls are straightened to within .002 inches total indicator reading and this accuracy is maintained throughout installation.

the war and Dixon was one of a number of firms that went after the business. Today there are 12 firms in the changeover business, with Dixon a frontrunner among them. In the last ten years the company has equipped more than 2½ million spindles with its changeover; and for four of those ten years, Dixon paced the field.

Mr. Miller, the company president, joined the firm in 1946 as a vice-president, and under his leadership Dixon has enjoyed steady growth and diversification. A plastics division, an outgrowth of this expansion, was formed to manufacture oilless bearings from a plastic formulation called Rulon. Development of Rulon enabled Dixon to be the first to offer, in 1948, oil-free drafting for spinning frames. Two of the top three spinning frame manufacturers also use the plastic bearings under a license agreement.

The application of tension to drafting aprons was another first accomplished by the company about three years ago. Back in 1949 the company was also the first to use self-aligning top rolls in this country, although they had been used in Germany prior to World War II. In 1957 the company introduced planetary draft gearing which is a simplified method of increasing draft constants on spinning frames. A year later Dixon introduced the first non-lubricating cradle.

Drafting elements available from Dixon today include the Cavalla-Roth, Casablancas, Two-Apron Shaw, Double-Apron Roth, Two-Apron ZDR and a Double-Apron Gwaltney.

Sales And Service

Joseph Bowler, formerly with Leesona Corp. and The Terrell Machine Co., is general manager of Dixon's newly-organized direct sales force, which includes sales and service representatives in Salisbury, N. C., and Columbus, Ga.

Lowenstein Establishes Paris Studio

M. Lowenstein & Sons is establishing a fully staffed design studio in Paris. The studio will operate as European headquarters for all Lowenstein, Wamsutta and Pacific Mills stylists. Some 40 French artists will translate and execute the ideas of the home office stylists for dresswear, sportswear, blouses, swimwear, knits, robes and lingerie for women and children, and menswear, in popular and better price goods for the general American market.

Spencer Love To Address Second World Congress Of Man-Made Fibers Next May

Love

J. Spencer Love, president of Burlington Industries, will be one of the featured speakers at the Second World Congress of Man-Made Fibers next May 1-4 in London, England. He will speak to the congress on "Looking Ten Years Ahead in the Textile Industry." Other American speakers will include Clarence Lapedes, president of Lion Uniform Inc., Dayton, Ohio, and William H. Grant of Sears, Roebuck & Co. Between 2,000 to 3,000 delegates from some 50 countries will attend the congress by invitation only. Two general addresses, two major lectures and a total of 22 technical papers are included in the program. Royston Dunford of Courtaulds (Alabama) Inc. is Congress National Secretary for the U. S.

Fancourt's new "penthouse" plant contains laboratory, manufacturing and office space in its 25,300 square feet.

At Greensboro: A Penthouse For Fancourt

THE W. F. Fancourt Co. of Philadelphia, Pa., a major supplier of chemicals to the textile industry, held formal dedication ceremonies September 9 at its new plant in Greensboro, N. C. The event marked the transfer of the company's executive headquarters from Philadelphia where the firm was organized in 1904.

Completion of the plant represents another milestone in Fancourt's history in that it will double the firm's productive capacity. New from the ground up, the three-story structure will house executive and sales offices and laboratory facilities in addition to manufacturing facilities.

A family-owned enterprise, Fancourt has grown from an early importer of olive oil to a top spot in its field. Its expanded line now includes some 80 products used by dyers and finishers of both woven and knit products. Its founder, W. F. Fancourt Jr., died in 1954, with W. F. III succeeding him as president. The younger Fancourt died a year later of cancer at the age of 44, with company reins passing subsequently to John Fancourt, the youngest male member of the family.

Open House An Empty House

An interesting sidelight to festivities at the Open House ceremonies was the fact that as late as September 8 construction on the new plant was running more than a month behind schedule, thanks to an unusually rainy Summer. What the accompanying pictures don't show is the fact that only one piece of production equipment could be installed in time for the festivities. Carpets were laid on the night of the eighth, shrubbery was planted the morning of the ninth, and the paving company finished the parking lot just as the first guests arrived. But who said an Open House has to be a "full" house?

The littlest Fancourts—Walter 6, Margaret 14 and John 10—marked the official opening with the traditional ribbon cutting.

John L. Fancourt is the third member of his family to head the company. The firm opened its first Southern office in 1937.

The Loomfixer And His Job

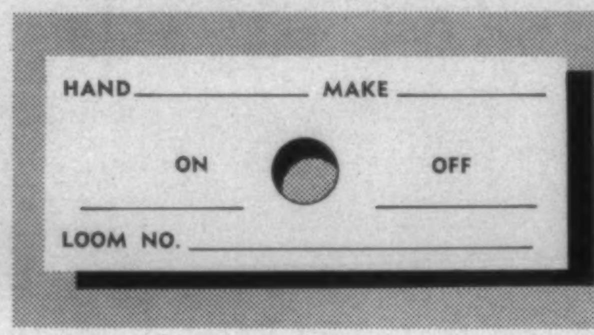
Part 33

IN CHOOSING REPAIR PARTS, DON'T BE CONVINCED YOU'RE GETTING THE BEST BUY UNTIL YOU'VE TRIED ALL OF THEM

By WILMER WESTBROOK

IT'S easy to imagine that a certain loom part or loom setting is best, or to have well-founded convictions on the subject. But to learn the true facts, it is necessary to make tests and keep records for a period of time and then compare results.

A loomfixer usually has a full-time job fixing looms and may not like the idea of also doing research work. But most loom tests are simple and require little of the loomfixer's time. Rewards in easier methods, longer-lasting loom parts, more efficient operation and standardization of settings will more than pay for the time taken to conduct the tests.



This tag is filled in and placed between the ends of the check strap; the bolt goes through the hole and keeps it in place.

Check Strap Test

As an example, some of the loomfixers in a mill were convinced that a certain make of check strap was best. Others liked another make of strap. Management arranged a test, not only of the two makes of straps in question, but of six different brands.

Straps of each kind tested were put on 12 looms each under as near similar conditions as possible. A tag was inserted between the ends of each strap where it was bolted onto the bracket. Data written on the tag showed the make of strap, loom number, date of installation and whether on the right or left-hand side of the loom.

As each strap was replaced because of wear or breakage, this data was recorded in a book. After all the straps had been replaced this data was tabulated and the results analyzed.

The result of this particular test was a surprise to both the loomfixers and management. Neither of the straps chosen by the loomfixers was best. Proven best from every angle was a strap that had not been used before because of its high initial cost. The test proved that this make strap was cheapest because it had a much longer service life than the straps then in use.

The mill cut its check strap cost from more than $2,000 per month to less than $1,200 and the loomfixers had less than half as much check strap installation and adjustment work to do. Also, the loom downtime was reduced which, of course, increased the output of cloth.

Supporting Data

To get a clear, overall picture it is often necessary to get supporting data for a test. For instance, a test of looms to determine the best operating speed cannot be based on increase of production alone. To make the test really accurate, it is necessary to also make loom stop tests, to compare supply costs, labor costs and any difference in quality of cloth.

For example: It was decided that an increase of loom speed from 182 to 192 p.p.m. in a weave room of 600 looms would increase production almost 5% with very little increase in operating costs. Half the looms were changed to the faster speed and a comparison test was made over a three-month period.

At the end of the test period these facts became apparent:

The percent increase of production did not materialize. In fact, the slower-speed looms averaged 5% more in pick counter readings than the faster looms and the actual poundage produced was about the same.

On the other hand, loom stops on the faster looms increased 25%, seconds increased 8%, supply costs soared to as high as 50% on some of the sections, and the weavers

Test data can be written or painted on the binder or inside the cover when the binder is re-covered.

A record such as this can be used to record all pertinent data for the testing of loom parts.

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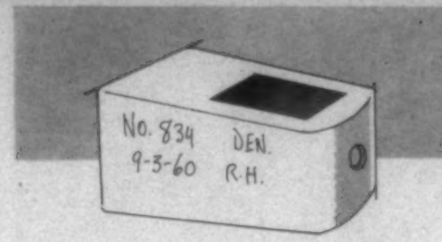


Many loom parts can have data written, painted, or stamped directly on them in a place where it will not be worn off.

and loomfixers on the looms with the increased speed became dissatisfied.

The mill, of course, changed all the looms back to the original speed of 182 p.p.m.

To test loom parts it is best to put needed data on the part itself. On parts such as the check strap a tag can be inserted or the data can be marked on the part with paint or waterproof ink. The loom number and date of installation can be stamped or written on the inside wall of a shuttle. A metal stamping set can be used to make a lasting inscription on wood or metal parts. Ink or paint can be used to mark the inside surface of parts such as the leather covering of box plates and binders.

Tests should be made periodically of such parts as pickers, shuttles, check straps, harness straps, lugs, picker sticks, binder leather, and the various bumpers and bushings. Most mills keep a permanent record of shuttles and this record can be used to compile data on service life, performance and cause of failure.

These tests not only show any variation in the service life of the part tested, they can also be used to locate and correct any wrong methods of installation and maintenance.

Consider Service Life

To get a clear picture it is best to break down the service life of a loom part into cost per loom hour. For instance, if a shuttle has a service life of 2,000 hours and costs $3.80, the cost per loom hour is $.0019. However, there are factors to be considered other than the initial cost of parts such as the shuttle. If one shuttle costs half as much as another and also has a service life half as long, it is still the most expensive because it will require twice as much labor for installation and the loom downtime will also be twice as much as for the shuttle with the longer service life.

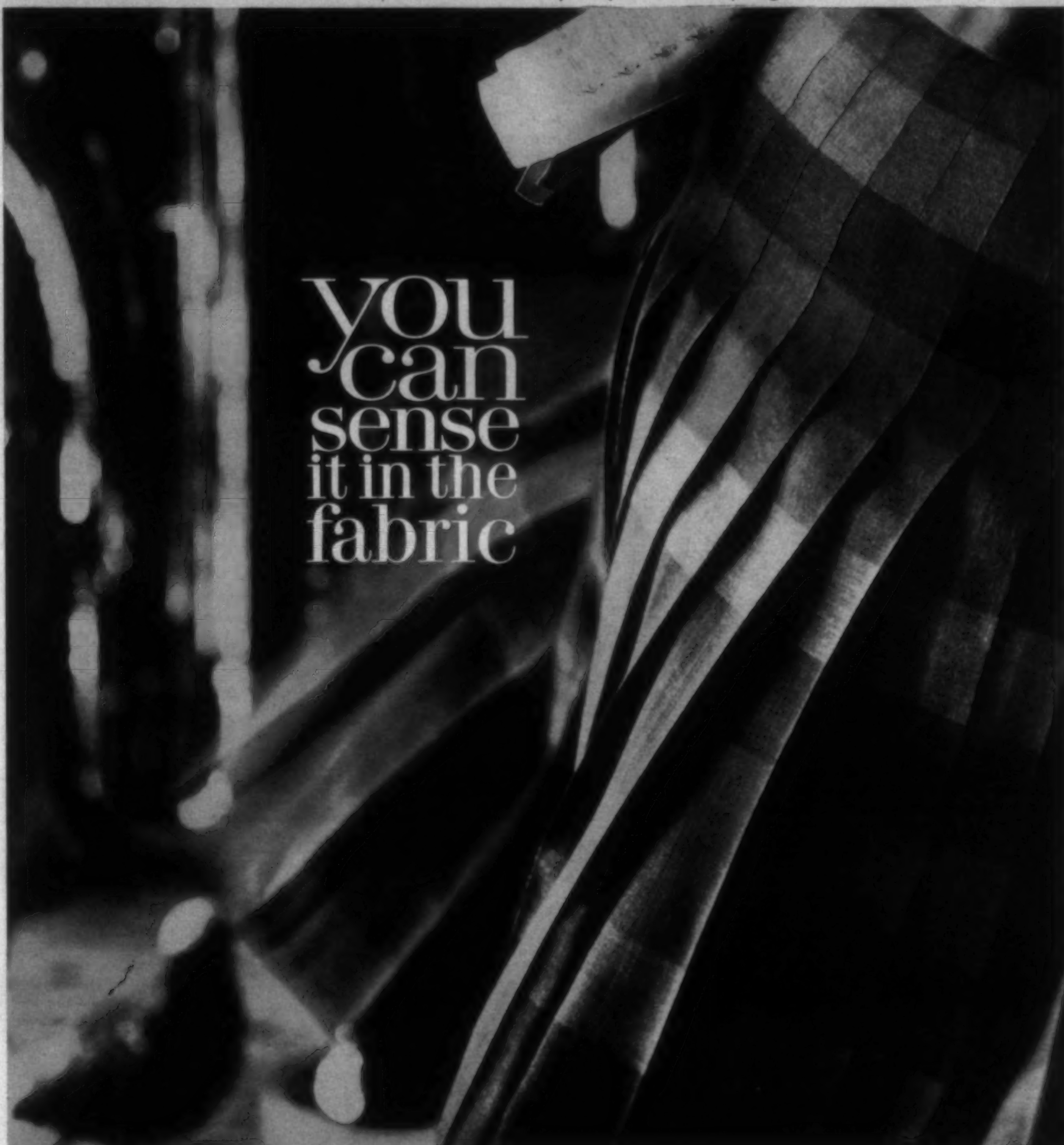
When making loom tests the loomfixer should realize that he is not only helping the mill remain in a competitive position, he is also helping himself by determining the best parts to use on his job—parts that will last longer, perform better and require less attention on his part.

To make the tests accurate and worthwhile they must be conducted fairly and impartially. Some loomfixers have been known to rig a test to prove themselves right after expressing an opinion about a certain loom part.

A check strap can be adjusted so that it will give less than 24 hours' service and a shuttle can be worn out in a week if the loomfixer is prejudiced and wants to make the test show up in favor of a given part or setting.

A change in loom parts or settings that is made as the result of a correctly made test will almost always benefit the loomfixer. It may be in increased service life of the part, in easier installation or maintenance, or in increased production. But it is always to the loomfixer's advantage to conduct and encourage these tests.

AS APPEARING IN: New York Times, The New Yorker, Harper's Bazaar, Vogue



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The Mechanics Of A Quality Control Program In A Finishing Plant

HERE'S HOW THE KENDALL CO. CONTROLS QUALITY AT ITS NEW FINISHING PLANT AT BETHUNE, S. C.

By R. L. WILSON*
The Kendall Co.
Bethune, S. C.

EVERYBODY has his own definition of quality control, each basically similar but nevertheless different. In giving you my definition, I will also list the objectives of our quality control program.

"Quality" refers to the significant characteristics of a product or process. "Control" means to make something behave the way we want it to behave, or to keep something within boundaries. "Quality Control" then, is a collection of efforts, both formal and informal, to achieve some desirable goal. To me, it means enabling our plant to produce consistently at a known, desirable quality level. It also means satisfying the customer by consistently giving him the quality of goods he has asked for, and can reasonably expect, and at the same time doing those things which are necessary to minimize costs by keeping seconds, refinishing and waste as low as possible.

Kendall's Bethune Plant

At its Bethune, S. C., plant, The Kendall Co. owns all of the goods processed. A majority comes from Kendall's own greige plants, but some goods are purchased from other plants. These all-cotton goods range in weight from heavy drills and ducks to lightweight tobaccos. The product lines are basically interlining, industrial, apparel fabrics, and diapers.

Many methods are used at Bethune to insure the quality of the outgoing products and to determine the quality of incoming materials. Many of the controls are quite routine. Others not so routine are equally important and useful. Practically all of the methods can be listed under the following:

(1) Acceptance Sampling
(2) In-Process Control
(3) Final Inspection
(4) Other Quality Control Practices

Acceptance Sampling

Because of the limitations placed on the finished product by varying quality levels of greige cloth vendors, the Bethune Plant established a formalized greige cloth acceptance program. Its objectives are to assure management that: (1) the plant is getting the best quality fabric for its money; (2) the quality of the fabric best suited for specific product or customer is selected; (3) cloth specifications are being met.

The program works like this. A number of samples are randomly selected from each shipment of greige goods received and a precise count is made to determine picks and ends per inch. The width of each sample is measured and yards-per-pound calculated. Tensile strengths and starch contents are checked on some styles. Weaving inspections are performed daily using the defect-point-system as a basis for rating vendors. This information is summarized weekly and reported to the cloth purchasing department where it is used as a guide to better purchasing.

Except where serious deficiencies are reported, cloth purchasing does not use this information to file claims against suppliers. Instead a letter is written informing the offending plant of the discrepancies found so that corrective action might be taken. If later purchases should indicate that corrective action has not been taken, the greige mill may be eliminated as an approved source.

Many of the constructions finished by the plant are supplied by more than one vendor. Utilizing the information on count, width, weight, tensile-strength, starch content and weaving quality, all suppliers furnishing each construction are compared and rated. We know as much and perhaps more about the greige cloth we receive as the mill supplying it.

Another segment of greige cloth acceptance is accomplished routinely as a part of the bleach range scray operator's duties. The greige goods are visually inspected as they are processed into the bleach range. Greige goods with an excessive amount of oil, hanging threads or poorly sewn seams are reported, together with samples, to the inspection department. A width measurement is also made and the results recorded in conjunction with the visual inspection.

By making every effort to keep the quality level of the raw material high, we are able to deliver a better quality finished product.

Other Raw Materials

In addition to greige cloth, other raw materials are also thoroughly checked. Chemicals are extensively tested. Manufacturer's claims are evaluated and must prove valid before a chemical—whether it be a starch, softener, catalyst or resin—is approved. This rigid procedure has kept problems to a minimum.

The dye house laboratory evaluates all new dyes purchased. Small yardages are processed and the dye performance studied. The plant dyer chooses his raw materials on the basis of these tests.

Water is a vital part of any finishing plant's operation, and we measure its quality in terms of pH, hardness and color. The pH is checked twice daily. Hardness and color are measured weekly.

These items are probably the most important raw materials, but there are many others. Cores, corrugated boxes, wrapping

*From a paper delivered before the Fall meeting of the Textile Quality Control Association, Oct. 5-6, Greensboro, N. C.

paper and machine parts will eventually become a part of the acceptance program as procedures are written to cover them.

In-Process Control

Every effort is made to reduce to a minimum the possibility of mixing constructions when issuing lots to the bleach ranges. This is an important problem that every finishing plant must solve. In our system all greige goods received are tagged with specially designed bale or roll tags. The tags are pre-printed with the name of the supplier, construction and purchase order number. The greige mill roll or bale number and yardage are written on the tag before it is affixed. When the goods are issued to the bleach range, half of the two-part ticket is removed to be used by the planning department in checking greige rolls off the balance cards, thus assuring that the lot is charged with the correct beginning yardage.

Bleach Range

Three random greige samples are taken from each lot bleached and are kept on file in the department for six months. The samples are checked by the inspection department before filing to make certain that the goods correspond to those specified on the process instruction sheet. Any discrepancy is immediately reported to the production and planning department.

As discussed under greige cloth acceptance, a visual inspection of the greige cloth is performed and recorded by the operators at the entering end of the bleach range. Another visual inspection is made at the storage bins for singe, scour and correct bleach. Any irregularity is immediately reported to the shift foreman. Many day-to-day problems have been rapidly traced and solved by utilizing and combining the records of such visual inspection.

The yardage in each lot is carefully measured as the goods are fed into the range. The total yardage measured is then compared to the greige mill tagged yardage and shortages are immediately reported.

Instrumentation on the continuous bleach range is designed to produce a consistently uniform within-lot and lot-to-lot bleach. The latest instrumentation methods for chemical and level controls—as well as temperature, caustic and acid concentrations—are used. All charts are filed for reference. A titration test is performed by the operator every 30 minutes to recheck acid, caustic, hypochlorite and peroxide concentrations.

Mercerizer

A visual inspection procedure on the mercerizer directs the operator to make a close inspection once every hour on a random two-yard sample. The operator also checks and records the tenter chain width every hour as well as the caustic temperature and total caustic used.

The chemical concentration on the mercerizer is automatically adjusted and recorded by the latest Twaddle control system. Concentration is also cross-checked every 30 minutes by the use of a hydrometer.

Drying Tenters, Cans

The drying tenter operator observes closely all goods run on his machine. Defective yardage is recorded on the box or roll ticket. The tickets are checked by the department supervisor before the lot is released to the next process. Any that are out of line are reported to the department foreman. The machine operator uses an inspection-methods standard as a guide in his inspection. The standard outlines what the operators should do when various types of defects are spotted. The defects are identified with colored markers which also have the type of defect pre-printed on them. This enables the next process to anticipate both the location and type of defect in the roll so that appropriate action might be taken.

Small samples are taken from every dried roll of selected lots for evaluation by the bleach department foreman. All other information available, such as chemical concentrations and processing speeds, is assembled. Samples are inspected for shade variation and bleach. Results are used by the foreman as a guide for determining chemical concentrations for future prepares and to arrive at the best quality bleach.

Automatic weft or filling straighteners are used to remove the majority of the bias in the cloth, making subsequent operations less complicated. Moisture Monitors are used on the tenters to indicate the residual moisture left after drying. These indicators are preset so that a "normal" reading delivers 6% in the goods. The operator must adjust the tenter house fans so that the indicator will point to normal.

Dye House

The visual inspection in the dye house is accomplished by the machine operators who indicate on the box truck tickets any defects seen. Serious defects are removed and immediately reported to the supervisor.

A procedure we call "patching off" is followed before a lot is released for dyeing. A small amount of yardage is first processed, and patches are taken at intervals. The dyer varies the formula until he is satisfied that the standard has been matched. Only then is the lot released for running. Sample patches are taken from each box as the lot is being run and are also checked against the standard. All lots are run to Kendall color standards or to samples supplied by the customer. To assist him the dyer has a color eye, a type of spectrophotometer. A Macbeth light that duplicates both day and artificial light is also used as a further aid for visual color evaluation.

The dye house laboratory is equipped to conduct the following tests: (a) lightfastness; (b) washfastness; (c) crocking (wet and dry); (d) salt water (for the life preserver trade); (e) solvent (for the tape trade); and (f) bleaching (for the uniform trade).

Starch Tenters

Each starch tenter operator is provided with a written inspection and methods standard similar to the one for the drying tenters, but different in that it was designed specifically for the finishing tenters. The front and rear operators work together closely, and two-way communication is maintained by means of sound-powered telephones.

Every lot of material is processed to a specific standard for color and hand. A complete file of these standards is maintained in the finishing department. As a lot is being run, the appropriate standard is kept at the production unit. Any variation is immediately reported.

The finishing formula itself is taken from the master formula book. Formulas are filed by hand-standard number with a cross-reference by style number. Formula tickets are filed by lot number at the delivery end of the tenters after the lot has been processed.

Tub samples representing results obtained with each new batch of finishing compound are taken at the delivery end of

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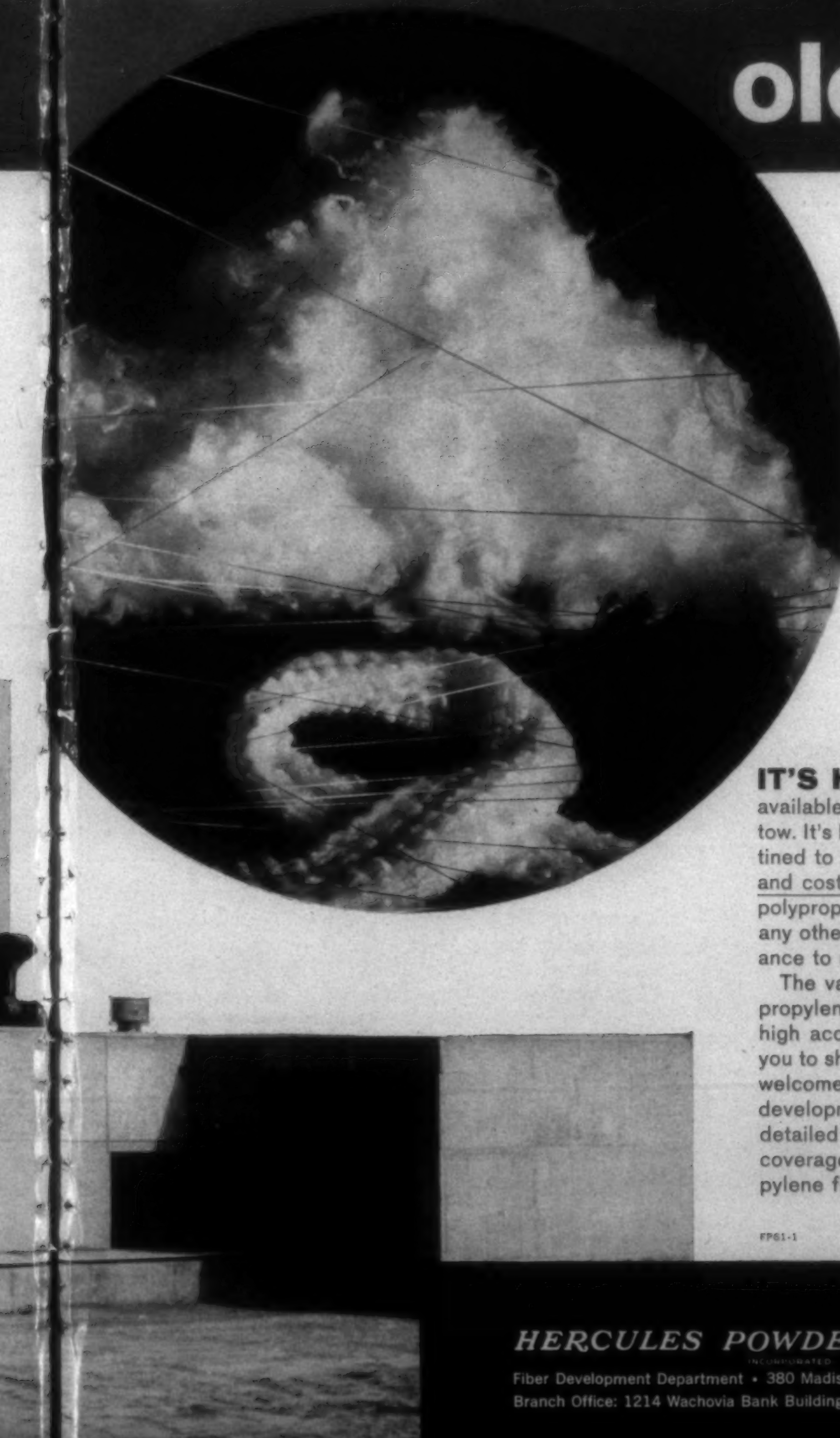

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the tenters and carefully checked for shade and finish uniformity.

Samples are taken from each box or roll at the delivery end of the tenters from all lots which go directly to the put-up department. These patches are used by the inspection department to check the hand and color before it can be put-up.

Some styles of goods require close weight control when the amount of pick-up is specified. Scales are kept at the delivery end of the tenters to check lots where such close control is indicated.

It is important that fabric stiffness off the tenters be carefully controlled and kept within predetermined boundaries. Our method of control is based on the Cantilever Test technique and is intended as a means of determining flex-stiffness of fabrics as delivered from the finishing tenters in order to better predict and control the ultimate hand of the final product. This method is suitable for testing fabrics with moderate to high stiffness, and is capable of yielding results that are reproducible within statistically predictable limits.

Each lot has its own production card and the card is kept in a bracket on the machine itself while the lot is being run. Operator's or foreman's comments are written on the cards as well as the yardage run. All information pertinent to running the lot is on this card and is in front of the operator at all times.

Instrumentation at each tenter includes liquid level controls which maintain a constant level of mix in the pad. A warning alarm sounds should the level drop below a pre-set point. Each machine is also equipped with an automatic weft straightener and a Moisture Monitor as well as individual fan controls, speed controls and variable thermostatic temperature adjustments with recording charts.

Sanforizers, Calenders, Curing Oven

Each operator has an inspection-methods standard for his particular operation. Sample patches are taken from each box or roll and are given to the inspection department after the supervisor has released the lot to the next operation. The hand and color standards from the finishing department files are used during the running of each lot and must show the lot to agree reasonably with them before the patches are given to the inspection department.

The Sanforizer wash test room contains equipment used in running the standard Sanforize test for residual shrinkage on every lot requiring any degree of shrinkage control or specific stabilization factor.

Laboratory

The laboratory at Bethune is centrally located and is available for making virtually all the standard textile physical and chemical tests as well as several of our own devising. It is responsible for checking all lots with finish specifications such as flame retardancy, water repellancy, absorbency, tensile, tear, count, weight and crease recovery to name but a few. All tests that are required for "Sanforize Plus" standards are also performed, including an electronic smoothness evaluation.

A large part of the laboratory's work is devoted to control of resin-treated fabrics. The tensile strength of the greige cloth is determined and results plotted on control charts. Additional samples are taken after bleaching and tensile and absorbency tests are made and plotted. Further samples are taken after curing, and tensile, crease recovery and tear are checked and plotted. The full gamut of tests are then run on the final afterwashed and calendered or Sanforized products. The laboratory releases or rejects the lot based on this final series of tests.

Final Inspection

Every lot processed through the plant must be evaluated and released by the inspection department before it can be wound or folded by the put-up department. Samples from each box or roll in each process lot are taken at the last production point, identified with the lot, box or roll and sent to the inspection department along with the production card bearing its performance record. The inspection department checks the samples thoroughly for uniformity and for conformance to hand and color standards. Shrinkage requirements, if any, and releases on any special laboratory tests that may have been specified are also checked. If everything is satisfactory, the lot is released for put-up.

The inspection department is also responsible for the re-inspection program where goods that have been put-up are selected at random and re-inspected for: (a) quality of the put-up department inspection; (b) general quality of the goods inspected; (c) accuracy of yardage.

This re-inspection program also includes finished diapers. A specified number are re-checked every day to give operating management assurance that existing inspection standards are being followed. Re-inspection results are used in pinpointing inspectors who need additional training in the use of the standards as well as bringing to light those inspectors who obviously do not have the proper temperament or aptitude for this work.

There is a large sign in our put-up department that says, "Our Customer Is The Next Inspector." We constantly try to improve our inspection methods so that this next and all-important inspector will be satisfied with what he finds. Re-inspection is an effective tool for keeping the quality of the original inspection at the highest possible level.

All departments forward their greige complaints to the inspection department with samples of the defect. These are reviewed, recorded and passed to the cloth purchasing department.

Put-Up Department

Operators in the put-up department are trained to remove non-passable defects and to make yardage allowances for other defects which are objectionable but passable. Each lot is inspected against a specific set of standards set up in conjunction with and approved by the sales department. The sales department assigns the specific grade (or level) of inspection to each process lot. Standards differ in the types of defects that are passed and advanced and the types that are removed, depending upon the end-use involved. We have about 20 different inspection standards with about 90% of all our styles falling under five of these.

A control sample of the process lot being inspected is selected by the inspection department and is given to the machine operator so that he may check the finish and general appearance during the run-off of the lot. The approved swatch is fastened to the inspection frame and is kept between the operator and the cloth during the running of the entire lot. The hand and color is checked every time the machine stops, which normally is at the end of the roll on the winder, or with every cut on the yarder.

Each operator records on a special inspection form the

yardage removed for specific defects. The tenter, calender or Sanforizer number and shift are also recorded to be later used for follow-up purposes. A separate record is kept by roll number and yardage to insure proper lineal figures on the finished product. As an added control measure, inspectors are required to write their initials and the yards on each piece taken from the roll. Inaccuracies are reported back to the foreman by the salvage department.

The inspecting operator's initials are stamped on the label that goes on each piece inspected. In the event of a complaint, the piece label pin-points the responsibility for defective yardage and reduces the possibility of a recurrence.

Every finished roll or bolt is carefully checked by put-up department color-shaders before it is released for packing. Shade numbers are marked on the piece ticket and no more than two shades are ever packed in the same carton. Representative samples of the shades in each lot are kept on file for future reference.

Few things will prompt a complaint from a customer faster than billing him for yardage he cannot find. The machine yardage-counter may be one source of such an error. All put-up department machine counters are checked weekly against a master counter, and any discrepancy is immediately corrected.

Diaper Department

All diaper styles are also individually inspected and graded according to their written inspection standards. The thoroughness of this inspection is spot-checked by the inspection department daily with the help of a statistical sampling procedure.

Other Quality Control Practices

Other quality control practices include items accomplished collectively to control quality. Broadly, it also includes the establishment of new techniques and procedures, and the continual evaluation of existing procedures.

A one-hour weekly quality meeting is attended by the heads of all departments and the superintendents. Quality problems encountered the previous week are discussed and solutions are offered. The weekly refinishing report is a major topic of discussion since it is a real measure of our process control. Yardages for different defects are totaled, and arranged in order from the greatest cause to the least. In addition, refinishing is broken down by departments and expressed as a percentage of the total. Complaints are also discussed and referred to the department originating the defectives.

In addition to discussing a complaint, each is thoroughly investigated with a detailed written report submitted to the sales department.

The refinishing report discussed in the quality meeting is a breakdown by lot number and style of the yardage refinished each week and the reasons for refinishing. The report is circulated to all echelons of management.

The refinishing analysis chart is periodically posted on the main bulletin board for the information of all employees. This weekly chart is a running record of performance as to the amount of refinishing and/or generally defective yardage produced.

A complete summary of each quality meeting with the reports that have been mentioned is distributed weekly to all foremen, assistant foremen and other personnel.

Quality control, when properly utilized, can be a dynamically effective tool which will enable any plant to produce finished products consistently at a known, desirable level of quality.

Do You Have What It Takes To Be A Supervisor?

YOUR MORALS CAN AFFECT YOUR JOB; YOU CAN'T AVOID CRITICISM, BUT YOU CAN ESCAPE GOSSIP AND RUMORS

PART 6

By WILMER WESTBROOK

AT a forum of mill overseers this question was asked: "What makes a good supervisor?" Most of the obvious answers of good personality, knowledge of the job, etc., came out first. Then someone mentioned good morals and good reputation.

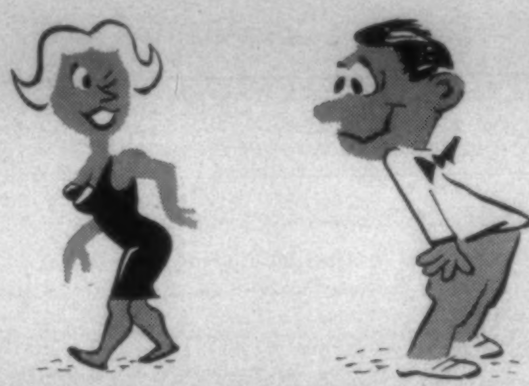
This reply brought on a lot of discussion, but the overseers were unanimous in agreeing that a man's morals have a lot to do with his success as a supervisor.

"My company loses very few supervisors because of their inability to run the job," one overseer stated. "But we have to demote, transfer or discharge many because of their drinking, gambling, failure to pay debts and for affairs with women."

An Exacting Job

The supervisor has an exacting job. He is constantly under pressure while in the mill. To offset the strain of his workday many seek an escape and turn to diversions which lead them in the wrong direction.

The social drink, or a small one to soothe the nerves, can lead to excessive drinking and alcoholism. A friendly game of penny-ante poker or gin rummy can develop into a no-



The supervisor faces many temptations in his job.

limit game, an obsession for gaming and mounting gambling debts.

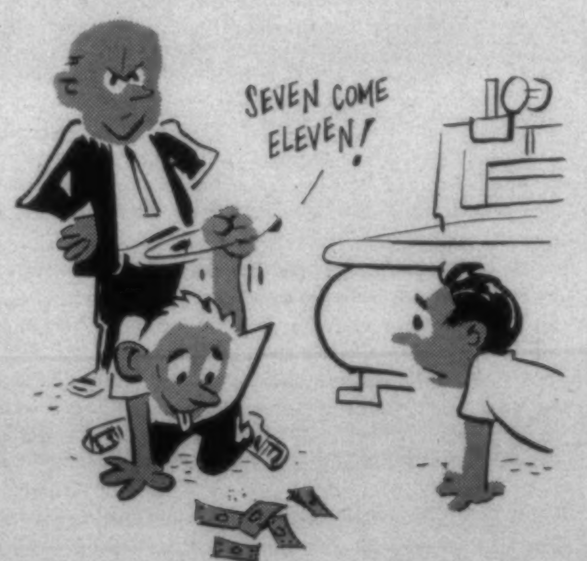
A mild flirtation with one of the women with whom he is in daily contact can grow into an affair. Such affairs are usually of short duration, but they can do irreparable harm. Many supervisors have lost job, family and reputation because of a pretty face or provocative figure.

The supervisor faces more temptations than does the average worker. Many of his subordinates will go to great lengths to gain personal favor. He is bombarded with offers advanced with a selfish motive and with a string attached.

Such seeming popularity will often affect the reasoning of a supervisor and he will begin to believe himself to be a great fellow, a lady-killer, and endowed with a personality that attracts a host of close friends.

A supervisor will move socially and professionally in a bigger circle. He will be under pressure to raise his standard of living, to buy a bigger house, a longer automobile, and to dress himself and his family better. Unfortunately, his salary will increase much less than will his financial responsibilities —real or imagined.

A man must be level-headed, have a real sense of values, and be able to exert considerable will-power to be a good supervisor. If he does not possess or develop these attributes he will run into serious trouble on the job sooner or later.

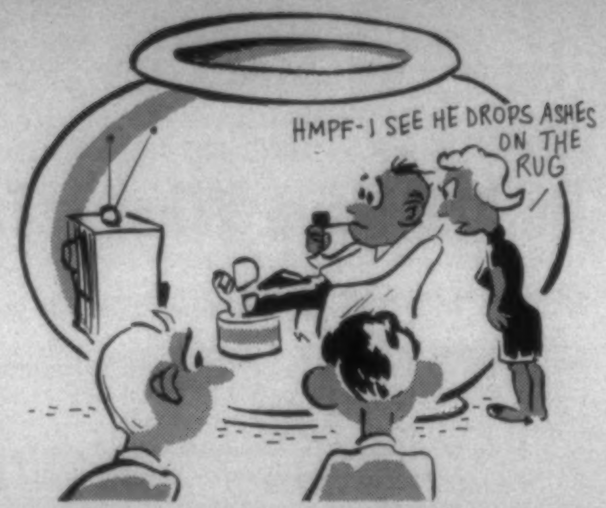


Management becomes concerned about a worker's vices when they interfere with his work.

Not Necessarily Saintly

However, a man does not have to be a paragon of virtue or a pillar of the church to be a successful supervisor. He simply must learn to distinguish between what is right and what is wrong for himself and for the job.

If he cannot take a drink without getting drunk, he should be a tee-totaler; if he can't roll a pair of dice without losing



The supervisor lives in a glass house. He is going to be criticized whatever he does.

the grocery money, he should never gamble; if he can't look at a pretty face without losing his head, he should confine his contacts with the opposite sex to strictly business.

Management is not composed of evangelists, fanatics, or do-gooders. It consists of hard-headed realists. These men have a job to do and they are looking for the right results all down the line. As long as a supervisor gets those results management cares little about his personal life.

But when outside activities interfere with the job, management does become concerned. That is why it will seldom place an unknown or unstable man in a supervisory position. Many supervisors may become bounders, but very few bounders become supervisors.

Some supervisors remain on the job long after they have become the subject of unsavory gossip or have established an unenviable reputation for lying or cheating. Such a situation does not mean that management is unaware of the condition or condones it—it may simply mean that the supervisor's assets to the job outweigh the liability of his reputation.

Such a supervisor is working on borrowed time. Management will begin to make plans as soon as an unfavorable report is received and if the supervisor doesn't do something himself to improve the situation, management will make a change sooner or or later.

Will Make Enemies

A supervisor must do many things that are unpopular. He cannot run the job properly without making enemies. The first ones to turn on him or to let him down are his fair-weather friends.

These so-called friends are the ones who cater to his every whim while he is in position to do favors for them. But, like the rats who leave a sinking ship, they abandon him or even assist in his downfall once he is on the skids.

A supervisor lives in a glass house. His words and actions are grist for the mills of gossip. Regardless of how well he conducts himself there will be those who, for one reason or another, start false rumors and insinuations.

So, if you have a lot of pull or happen to be on a job where it is almost impossible to get a satisfactory replacement, you may get by with dissipation. But the average supervisor should take the advice of the overseers in the forum:

"Build a good reputation and remain morally clean."

How Can Statistics Be Used In Quality Control?

HERE ARE SOME PRACTICAL APPLICATIONS FOR USING STATISTICAL DATA IN EVALUATING PRODUCT QUALITY

By M. L. WALKER*
M. Lowenstein & Sons
Anderson, S. C.

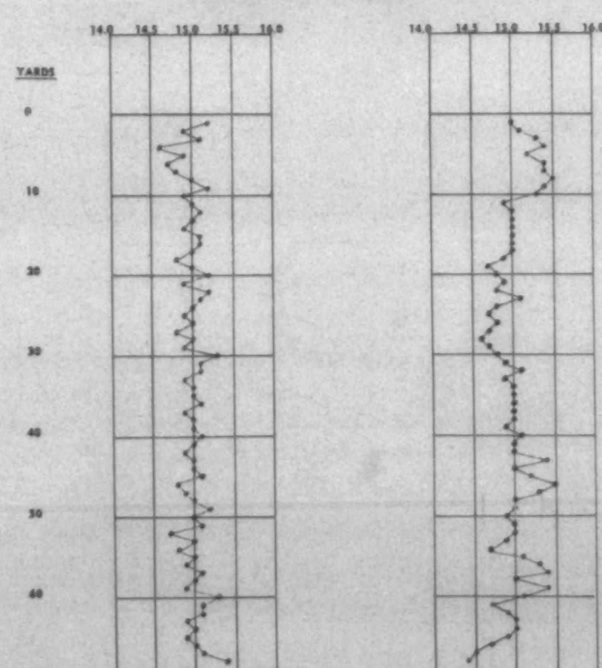
HOW do we use statistics in quality control? Statistics can be defined as the measurement of the average and variation about the average. Certainly variations in raw materials and processes affect quality, and the decisions must be made and action taken on degrees of variation throughout the processes. With the aid of statistical techniques, decisions can be made based on facts. Helpful facts that can be determined are: correct sample size, proper cycle the sample should be made on, the best time to take these samples, what variation lies within a machine, and how much variation there is between machines.

Some of the basic tools in statistical quality control are frequency distribution, standard deviation, co-efficient of variation and control charts.

One of the best illustrations of frequency distribution is used in testing a picker lap on a Saco-Lowell lap tester. In this test we weigh one-yard lengths and plot the weight, in ounces, of each yard on a graph. When we compare the results of two or more of these tests we can look at the graph (Fig. 1) and tell that one is better or worse than the other. But by making a frequency distribution of the test results (Fig. 2), it is easier to tell the different patterns of variation.

*From a paper entitled "Practical Application of Statistics in Quality Control," presented at the Fall meeting of the Textile Quality Control Association, Oct. 5-6, Greensboro, N. C.

Picker Lap Test
Yard Weights In Ounces
Standard 15 Ounces



Picker Lap No. 1 **Picker Lap No. 2**

Fig. 1

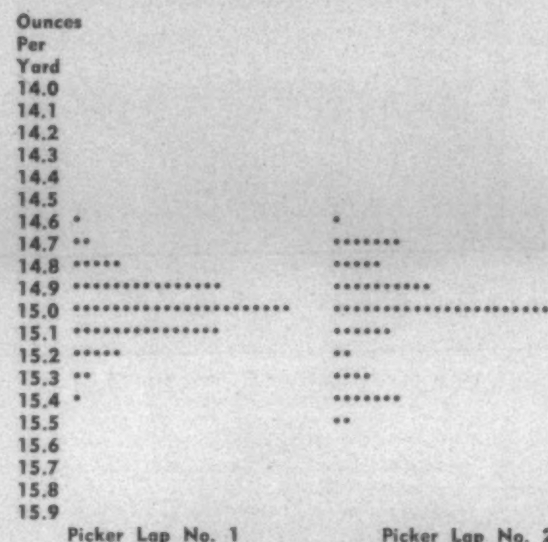


Fig. 2—Frequency Distribution

In football, if every man on the offensive team carries out his assignment as he should, then almost every play would result in a touchdown. But because assignments are not carried out correctly, all plays do not result in touchdowns. This same principle is true in processing a picker lap. If the picker operates properly and the stock is fed properly, the frequency distribution would be a so-called "normal pattern."

Average And Standard Deviation

As helpful as these frequency distributions are, they need a *number value* for comparison and mathematical handling. However, these values can be applied and result in two very important factors helpful in quality control work. These values are the average, or arithmetic means, and the standard deviation. The average for a set of test data would be the sum of each individual value divided by the number of individual observations.

The standard deviation is a numerical value applied to the amount of variation about the average. Figs. 3 and 4 illustrate the computation for the standard deviation from the test data of the picker laps in Fig. 1.

The values of .143 and .236 are the standard deviations of the distributions. It is a numerical value of the amount of variation in these sets of data.

Co-efficient of variation is the percentage variation based on the average and is calculated from the standard deviations.

(Continued on Page 84)

Computation Of Standard Deviation
2nd Co-Efficient Of Variation
Of Picker Lap No. 1

Wt. Oz./Yd.	Freq.	Freq. (X) Wt./Yd.	Deviation From Avg.	(Deviation)²	Freq. (X) (Deviation)²
14.6	1	14.6	.4	.16	.16
14.7	2	29.4	.3	.09	.18
14.8	5	74.0	.2	.04	.20
14.9	15	223.5	.1	.01	.15
15.0	22	330.0	0	—	—
15.1	15	226.5	.1	.01	.15
15.2	5	76.0	.2	.04	.20
15.3	2	30.6	.3	.09	.18
15.4	1	15.4	.4	.16	.16
Total	68	1020.0			1.38

Average = 1020.0 ÷ 68 = 15.0 Oz./Yd.

$$\text{Standard Deviation} = \sqrt{1.38/68} = .143$$

$$\text{Co-Efficient of Variation} = \frac{.143 \times 100}{15.0} = .95\%$$

Fig. 3

Control Charts

Statistical quality control charts are probably the most commonly used statistical tool in our industry today. Most are based on "three sigma limits," which means that three standard deviations are added to the average for the upper control limits, and three standard deviations are subtracted from the average for the lower control limits. If the data upon which the charts are based are representative, and if a state of statistical control existed when this data was obtained, then all further data in statistical control will fall within these limits. When data falls outside these limits, something is out of control.

Samples of any process must be representative of the process, and after the group from which samples are to be taken has been established, it is important that the samples

Computation Of Standard Deviation
2nd Co-Efficient Of Variation
Of Picker Lap No. 2

Wt. Oz./Yd.	Freq.	Freq. (X) Wt./Yd.	Deviation From Avg.	(Deviation)²	Freq. (X) (Deviation)²
14.4	1	14.4	.6	.36	.36
14.5	1	14.5	.5	.25	.25
14.6	1	14.6	.4	.16	.16
14.7	7	102.9	.3	.09	.63
14.8	5	74.0	.2	.04	.20
14.9	10	149.0	.1	.01	.10
15.0	22	330.0	0	0	0
15.1	6	90.6	.1	.01	.06
15.2	2	30.4	.2	.04	.08
15.3	4	61.2	.3	.09	.36
15.4	7	107.8	.4	.16	1.12
15.5	2	31.0	.5	.25	.50
Total	68	1020.4			3.82

Average = 1020.4 ÷ 68 = 15.0 Oz./Yd.

$$\text{Standard Deviation} = \sqrt{3.82/68} = .236$$

$$\text{Co-Efficient of Variation} = \frac{.236 \times 100}{15.0} = 1.57\%$$

Fig 4

Roving Weights For 1.50 Hank Roving

Bobbin No.	Roving Weight 1	2	3	4	Average	Range
1	1.51	1.50	1.52	1.49	1.505	.03
2	1.47	1.47	1.49	1.50	1.483	.03
3	1.51	1.46	1.46	1.48	1.478	.05
4	1.50	1.54	1.50	1.47	1.503	.07
5	1.46	1.45	1.47	1.47	1.463	.02
6	1.50	1.52	1.51	1.50	1.508	.02
7	1.52	1.54	1.49	1.51	1.515	.05
8	1.53	1.54	1.53	1.55	1.538	.02
9	1.46	1.44	1.45	1.49	1.460	.05
10	1.50	1.51	1.51	1.49	1.503	.02
11	1.50	1.50	1.51	1.50	1.503	.01
12	1.46	1.48	1.46	1.52	1.480	.06
13	1.53	1.53	1.51	1.50	1.518	.03
14	1.47	1.49	1.48	1.47	1.478	.02
15	1.44	1.46	1.49	1.45	1.460	.05
16	1.51	1.52	1.49	1.53	1.513	.04
17	1.50	1.51	1.53	1.55	1.523	.05
18	1.43	1.47	1.44	1.45	1.448	.04
19	1.47	1.50	1.49	1.46	1.480	.04
20	1.55	1.56	1.54	1.55	1.550	.02
				Total	29.909	.72
			$\overline{X}$		1.495 $\overline{R}$	.036

Fig. 5

be selected in a random manner. It is also important to take small samples frequently and identify them as to type material, what machine, time, shift, etc. By using this method of sampling, control charts will be of great value in controlling quality.

Sampling also must have the grouping of data or the forming of the sub-groups so that the variations within the sub-groups can be attributed to chance or non-assignable causes. The proper sub-grouping of data *cannot* be determined mathematically; it can only be done by judgment and technical knowledge of the process being measured.

Construction Of Control Charts

There will be two types of control charts constructed from a single set of data (Fig. 5). The first chart will be the $\overline{X}$ chart or the control chart for averages. The second chart will be the R chart or chart showing the variation within sub-groups or range.

To construct the $\overline{X}$ chart it is first necessary to determine the process average and standard deviation. The following data represents the weights of 1.50 Hank Roving from 20 bobbins, four weights from each bobbin.

Calculate the standard deviations, for individuals by the short method using the following factor.

Factors For Converting Average Range To Standard Deviation

Sample Size	Factors
2	.89
3	.59
4	.49
5	.43
6	.40
7	.37
8	.35
9	.33
10	.32
12	.31
15	.29
20	.27

Average Range on $\overline{R} = .72 \div 20. = .036$ $.036 \times .49 = .01764$

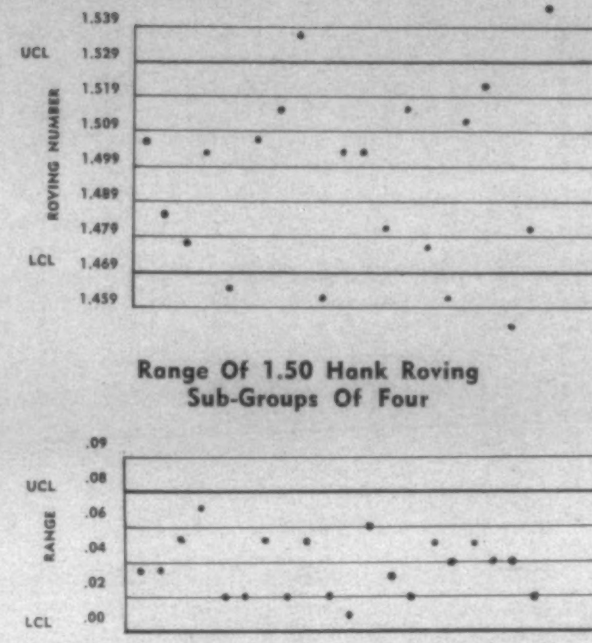


Fig. 6

Calculate the standard deviation for averages of sub-groups of 4

Standard Deviation for

$$\text{Individuals} \div \text{Sub-group} = \frac{.01764}{\sqrt{4}} = .00882$$

Determine upper and lower control limits using "three sigma limits."

$$UCL = 1.495 + 3(.0088)$$
$$1.495 + .0264 = 1.521$$
$$LCL = 1.495 - 3(.0088)$$
$$1.495 - .0264 = 1.469$$

To establish the limits for the R chart, which tells us what the variations within the sub-groups are, we use factors which have been prepared for us. These constants are values which result in range control limits corresponding closely to those furnished by the American Standards Association.

Table For Factors D_3 and D_4

Sample Size	Factor D_3	Factor D_4
2	0	3.268
3	0	2.574
4	0	2.282
5	0	2.114
6	0	2.004
7	.076	1.924
8	.136	1.864
9	.184	1.816
10	.223	1.777

$$\text{Upper control limits} = \bar{R} \times D_4 = .036 \times 2.282 = .08$$

$$\text{Lower control limits} = \bar{R} \times D_3 = .036 \times 0 = 0$$

After the charts have been constructed and the data is being plotted the charts must be observed closely. When points fall outside the limit, there is no longer a state of statistical control and action to determine the cause must be taken.

Here the quality control department and the supervisory personnel must work together to bring troubled processes under control. Our statistical technique can be very elaborate and the charts beautiful, but if they are not used when and how they are intended to be used, then the program is of no value. Supervisory personnel must feel the need of this program and understand it, for they are the people who are responsible for quality.

These techniques can be used for many things, from evaluating raw material to what new machinery is needed and what make of machine should be purchased to give the best results.

Statistics is an organized system of probability, a tool to use in the evaluating of quality that enables us to make decisions on facts and sound judgment.

A.C.M.I. Lists Convention Sites

The 1964 annual meeting of the American Cotton Manufacturers Institute will be held April 2-4, 1964, at the Palm Beach Biltmore Hotel, Palm Beach, Fla. The Biltmore will also be the site of the institute's 1962 annual meeting, scheduled for March 29-31. The 1963 meeting will be March 21-23 at the Hollywood Beach Hotel, Hollywood Beach, Fla.

N.T.A. Holds 107th Annual Meeting; Re-Elects Stanton Board Chairman

The Northern Textile Association, at its 107th annual meeting September 14-15, re-elected Seabury Stanton, president of Berkshire Hathaway Inc., New Bedford, Mass., as its chairman for the coming year.

Named to one-year terms as vice-presidents were Lawton S. Brayton, Sagamore Mfg. Co., Fall River, Mass., and Roger M. Grimwade, Charlton Woolen Co., Charlton City, Mass.

Named to three-year terms on the board of directors were William Howard Lehmberg, American Felt Co., Glenville, Conn.; Edward B. Stevens, Maine Spinning Co., Sanford, Me.; Carroll F. Holt, Fitchburg Yarn Co., Fitchburg, Mass.; Ronald A. Mitchell, Cyril Johnson Woolen Co., Stafford Springs, Conn.; and George A. Dorr Jr., Dorr Woolen Co., Guild, N. H.

Re-elected president was William F. Sullivan of Belmont, Mass., the association's chief executive officer.

In his annual convention report, Sullivan advised the members to view with caution and moderate encouragement the developments of the last nine months. "We face a new situation," he said, "in working out practical and realistic solutions to the textile problem with government. We are feeling our way along step by step and I believe the government is doing the same. The outcome can be predicted within a few months as a result of matters now pending," he pointed out.

"One of these," he noted, "is the industry petition before the Office of Civil and Defense Mobilization. A favorable ruling will give President Kennedy the broad powers necessary to deal with foreign trade problems effectively and as he chooses either through international negotiations or otherwise."

Other matters stressed by Sullivan were early action on two-price cotton; prompt administration of the Geneva Cotton Textile Agreement; and government action to handle the import concentrations in wool and man-made fiber textiles.

How To Design And Lay Out Multiple Fabrics

THREE AND FOUR-PLY FABRICS OFFER SPECIAL PROBLEMS; THEY'RE COSTLY TO PRODUCE, RESTRICTED IN THEIR USE

By E. B. BERRY

PART 4

ALL the fabrics reviewed so far in this series have been of two layers. This chapter covers three and four-ply fabrics which are very special as well as rather restricted in their use. The Callaway Textile Dictionary defines "triple cloth" as:

A cloth made with three sets of warp and three sets of filling and consisting of three distinct layers of cloth—each having its own weave—stitched together during weaving; Used for heavy cloths and special fabrics for industrial purposes, such as, belting, brake lining, webbing, laundry padding, etc.

Three layers of fabrics are made to give extra weight, but it must be kept in mind that weight is not the only consideration. A "naught" duck is made in much heavier weight than a three-ply topcoating. The point or aim in designing a three-layer fabric is to get pliability and flexibility with a heavy weight. This cannot be obtained with the naught duck, for it is a single-layer fabric, with a K_1 in excess of 28 and a K_2 in excess of 14.

Different colors are seldom woven in three-layer fabrics. Rather, when colors are wanted or needed, the yarns are all dyed the same color, or the fabric is piece dyed. When different colors are woven, the warp is generally arranged 1 face-1 middle-1 back, and the filling is arranged 2 face-2 middle-2 back, otherwise, a pick-and-pick loom would be needed.

A three-ply topcoating material is wanted in a construction of 72 ends $\times$ 72 picks. The warp yarn is 20/2 and the filling is 10/1 with both yarns a blend of 80% rayon and 20% Orlon. "Off loom" width is to be 47 inches with a warp crimp of 11% and a filling crimp of 6%. This comes to 14 ounces per running yard (47 inches wide). Compared with the 1/0 Naught Duck which is 19 ounces for a 22-inch width, this is comparatively light in weight.

The first step in the lay-out of this triple cloth is to determine the size of the repeat. In the accompanying illustrations, all three layers are a 2-2 45° right twill. This will make

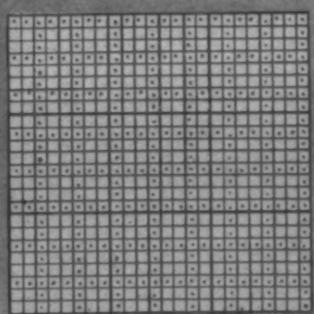


Fig. 1

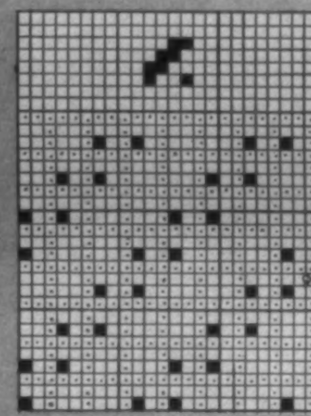


Fig. 2

a left twill on the back, when the fabric is turned over. The middle layer can be a different weave from the face and back, for it is never seen. However, it should have the same number of interlacings as both the face and back weaves, so the contraction will be the same, and thereby allow one loom beam when weaving.

In this case the 2-2 twill repeats on 4 ends and 4 picks. Since there are three layers of this fabric, it will need 4 $\times$ 3 layers = 12 ends and 12 picks. These layers will have to be stitched together. This is done with a satin many times. An 8-harness satin is a multiple of the 4 (2-2 twill), so this will be used. That means there will have to be 8 ends and 8 picks in each of the three layers, or a total of 24.

Both warp and filling in all three layers are the same yarn number (single equivalent), and are all natural yarns. Both systems of yarns are arranged 1 face-1 middle-1 back. This introduces a new key to express the weave for the center layer. A sinker is still expressed as a blank, but a circle (0) is a raiser.

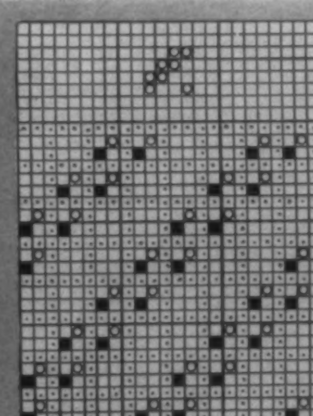


Fig. 3

Fig. 1 is the arrangement of the ends and picks for this triple layer fabric. The dot represents the back layer, and is not the weave. At the top of Fig. 2 is the face weave (2-2 twill). This weave is then painted on face ends and face picks.

The center weave is shown at the top of Fig. 3. This is a 2-2 twill, and is then painted on middle ends and middle picks.

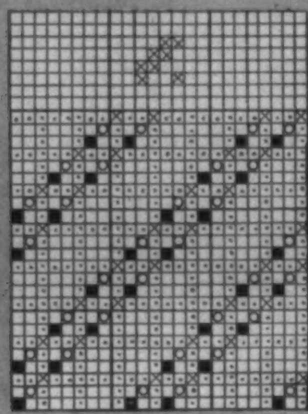


Fig. 4

Fig. 4 shows the back weave which is also a 2-2 twill. This is then painted on back ends and back picks. At this point there is no suggestion of three layers in the fabric. The loom does not know we want a triple cloth. If this weave were pegged on a dobby loom it would result in a 1 up-2 down-1 up-8 down 45° right-hand twill.

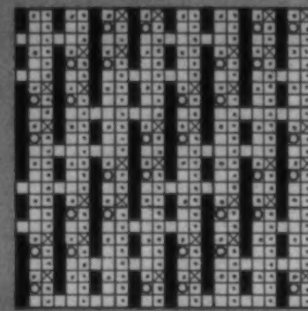


Fig. 5

It is necessary now to separate these ends and picks into three distinct layers, so that face ends will weave only with face picks; middle ends will weave only with middle picks; back ends will weave only with back picks.

When the middle and back picks are thrown, the face ends must be lifted out of the way, so the face ends will not interlace with the middle or back picks. This is accomplished by raising face ends over middle and back picks as seen in Fig. 5. At this point there are two layers of fabrics. The upper one will be a 45° right-hand 2-2 twill, and will have 24 ends per inch and 24 picks per inch. Underneath is the bottom layer

with a 1 up-2 down-1 up-8 down 45° right-hand twill, and will have 48 ends per inch and 48 picks per inch.

It is necessary to create two layers out of this lower layer. This is accomplished by raising middle ends over back picks as seen in Fig. 6. Now there are three layers of cloth, each one having 24 ends per inch and 24 picks per inch.

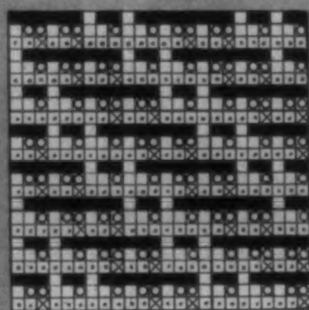


Fig. 6

These three layers now must be stitched together. Just how the stitching is done is somewhat a matter of preference, since there are several ways of doing this.

In Fig. 7, the middle ends are raised over face picks, between 2 raisers on the face, and next to a raiser of the middle. Then middle ends are dropped under back picks, between 2 sinkers of the back, and next to a sinker of the middle. This method has the advantage of requiring a fewer number of harness than other methods.

Fig. 7

A tape selvage is shown, for all the picks from the three layers weave with the same selvage ends. The reeding is 3 ends per dent in the body. In reality, there is only one end per dent from each layer. Depending on the sley of another fabric, it may be more practical to reed 6 ends per dent. Both are shown in the reed plan. There are 16 harness needed for the body, four for the face, four for the back and eight for the middle.

Fig. 8

An alternate method of stitching is to sink face ends under middle picks, between 2 sinkers of the middle and next to a sinker of the face. Then raise back ends over middle picks between two raisers of the middle and next to a raiser on the back. This method is seen in Fig. 8. There are 20 harness needed for the body.

A mill may be asked to weave a sample that will open out to three times the woven width. This is rather an exceptional situation, but it could occur. As outlined in Part I (T.B., July 1961, P. 62), the cycling of the filling determines where the hinge of the fabric will be.

A plain weave fabric will be used in our illustration. The warp is arranged 1 face, 1 middle, 1 back and the filling will be arranged 1 face-1 middle-1 back-1 back-1 middle-1 face. This puts the left-hand selvage in the top layer, and the right-hand selvage in the bottom layer. A tape selvage is shown. Fig. 9 shows the weave for this fabric. The reeding is 6 per

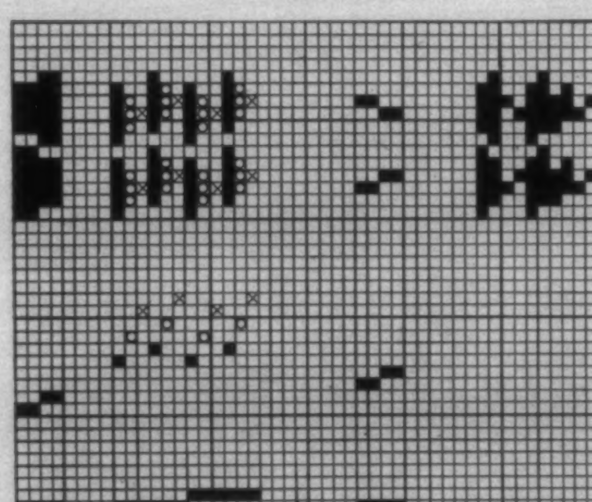


Fig. 9

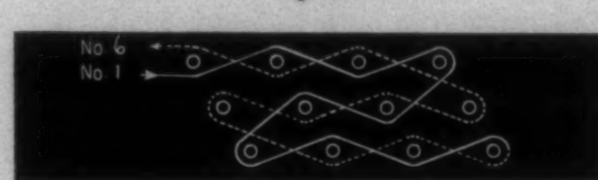


Fig. 10

dent, but is 2 ends per dent from each layer. Fig. 10 is a cross-section cut parallel to the filling.

Another odd condition would be to weave a pillow tube 40 inches wide, on a loom that has only 30-inch reed space. This will make a four-layer fabric as it is woven. Here the warp is arranged 1 face, 1 upper middle, 1 lower middle, 1 back, while the filling is arranged 1 face, 1 back, 1 lower middle, 1 upper middle. Fig. 11 shows the weave, while Fig. 12 is a cross-section cut parallel to the filling.

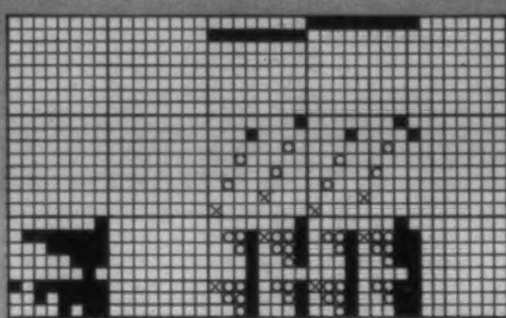


Fig. 11

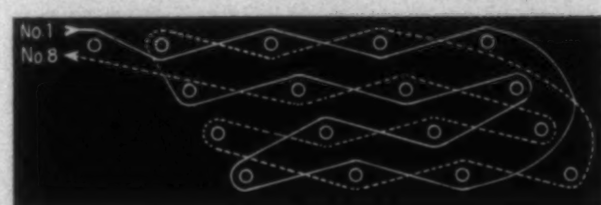


Fig. 12

A flat would be formed where the top and upper middle layers come together. To overcome this, one extra end is added to the top layer. The reeding is 8 ends per dent, but this is only 2 ends per dent for each layer. Since this is a pillow tube, there is no selvage.

In these multi-layer fabrics, cost is an important item. It may be possible to weave samples to show the customer, but cloths that are woven to open out to twice or three times the woven width are not economically sound for production.

News Of The Trade

August Cotton Consumption Up Over July But About Same As August 1960

The Bureau of the Census reports that cotton consumption for August was some 150,000 bales higher than July, but roughly equivalent to August a year ago.

Total consumption amounted to 690,188 bales as compared with 539,575 in July and 684,011 in August 1960. Daily average consumption totaled 34,509 in August of this year as compared with 26,979 in July and 34,201 a year ago.

Consumption in the cotton growing states amounted to 33,312 bales in August, with New England consuming 1,077 bales. Stocks on hand at the end of the month totaled 6.1 million bales, down from the 6.7 million at the end of July and the 7.1 million at the end of August 1960.

Total consumption of man-made fiber staple for the month amounted to 46 million pounds as compared with 36.7 million in July and 38 million in August of last year.

Cotton System Spinning Spindles
August (July 30-August 26)

Area And State	In Place (Thousands)	Consuming 100% Cotton Active (Thousands)	Consuming Other Than Cotton Active (Thousands)
United States, Total	*19,614	*17,270	*1,795
Cotton-growing States	18,178	16,175	1,662
Alabama	1,568	1,434	64
Georgia	2,845	2,631	165
North Carolina	5,681	4,837	734
South Carolina	6,661	5,990	639
Tennessee	468	416	27
Texas	217	193	**
Virginia	579	538	**
Other States	159	136	14
New England States	1,354	1,047	114
Connecticut	151	**	**
Maine	285	260	**
Massachusetts	515	408	72
Rhode Island	279	240	**
Other States	124	**	**
Rest of U. S.	82	48	19

Note: Detail may not add to totals because of independent rounding.
*Approximately 1% estimated for small firms reporting annually.
**Cannot be shown separately. Included in U. S. and Area totals.

Chemical Finishing Conference Will Be Held November 8-9 In Washington

The tenth annual Chemical Finishing Conference, sponsored by the National Cotton Council, will be held at the Sheraton Park Hotel in Washington on November 8 and 9. Godfrey S. Rockefeller, president, National Association of Finishers of Textile Fabrics, and also president, Cranston Print Works Co., New York, will be conference chairman.

Chairman of the opening session will be Dr. Guiliana Tesoro, assistant director of research, central research laboratory, J. P. Stevens & Co., Garfield, N. J. Speakers at this session include Dr. Emery Valko, research foundation, Lowell Tech, Lowell, Mass., "Wet-Only Wrinkle Recovery by High Temperature Cure"; Dr. Robert A. Gill, research laboratories, Rohm & Haas Co., Philadelphia, Pa., "Effect of Humidity on Crease Recovery of Modified Cottons"; and S. James O'Brien, textile chemical research, American Cyanamid Co., Bound Brook, N. J., "Chemical Bonding of Wrinkle Resistant Finishes in Cotton."

Chairman of the afternoon session on November 8 will be Henry Tovey, National Cotton Council, Washington. "All-Cotton Stretch and Bulked Yarn and Fabrics," will be discussed by Dr. C. H. Fisher, director, Southern Utilization Research & Development Division, U. S. Department of Agriculture, New Orleans. He will be followed by John F. Krasny, Harris Research Laboratories, Washington, who will cover "Fabric Construction for Wash-and-Wear Cottons." Dr. S. P. Hersh, research department, Union Carbide Chemicals Co., South Charleston, W. Va., will conclude the session with a paper on "Effects of Tension in Wash-Wear Finishing of Cotton."

The final session on Thursday, November 9, will be chaired by Allan J. McQuade, chief, Textile Functional Finishes Branch, Quartermaster Research and Engineering Command, Natick, Mass. Wilson Reeves, chief, cotton finishes laboratory, Southern Utilization Research and Development Division, will discuss "Acid Hydrolysis of N-Methylol Finishes."

"Prevention of Bleach-Induced Yellowing of APO-Finished Cotton" will be discussed by Dr. R. B. LaBlanc, organic process development laboratory, The Dow Chemical Co., Freeport, Tex. William H. Petersen, chemical division, Minnesota Mining & Mfg. Co., St. Paul, Minn., will describe "Oil and Water Repellent Fluorochemical Finishes for Cotton."

Second Quarter Woolen & Worsted Goods Up 23% Over First Quarter, 4% Below '60

Woolen and worsted fabric production during the second quarter of 1961 totaled 77.3 million finished linear yards, 23% above the first quarter 1961 level and 4% below the output during the comparable period of 1960, according to the Bureau of the Census, U. S. Department of Commerce.

The output of women's and children's clothing fabrics at 45.5 million finished linear yards was 27% above the previous period and 1% below the second quarter 1960 level. Men's and boys' clothing fabric production increased 22% from the previous quarter's level and was 7% below the output during the second quarter of 1960.

Production Of Woolen And Worsted Woven Goods
Second Quarter, 1961

Divisions, Regions And States**	Woolen and Worsted Fabrics (except felts)			
	Total (1,000 Linear Yards)	Apparel Fabrics (1,000 Linear Yards)	Non-apparel Fabrics (1,000 Linear Yards)	Woven Felts (1,000 Pounds)
United States, Total	77,282	76,035	1,247	2,276
New England	34,600	34,285	315	421
Maine	7,902	7,899	3	139
New Hampshire	8,473	*	*	*
Vermont	850	850	—	—
Massachusetts	12,104	12,003	101	*
Rhode Island	3,267	3,267	—	—
Connecticut	2,004	*	*	*
Middle Atlantic	3,737	3,682	55	1,321
New York	717	717	—	*
New Jersey	84	84	—	—
Pennsylvania	2,936	2,881	55	*
North Central	1,736	*	*	*
South	36,370	35,780	590	*
Virginia	3,653	*	*	—
North Carolina	6,906	6,461	445	—
South Carolina	10,211	10,211	—	—
Georgia	11,594	*	*	—
West	839	*	*	—

* Withheld to avoid disclosing information for individual companies.
** Data for each producing state not shown separately has been withheld to avoid disclosing figures for individual companies. These states are: North Central: Ohio, Illinois, Michigan, Wisconsin, Minnesota, Iowa and Missouri. South: Maryland, West Virginia, Tennessee, Alabama and Texas. West: Utah, Washington, Oregon and California.

Promotions, Resignations, Honors, Transfers, Appointments, Elections, Civic and Associational Activities

PERSONAL NEWS

The U. S. Department of Agriculture has announced the appointment of John T. Wigington and M. Earl Heard as advisers to the department's Southern Utilization Research and Development Division at New Orleans. Wigington, director of the technical service division of the American Cotton Manufacturers Institute at Clemson, S. C., was formerly with U.S.D.A. in its

Wigington

Heard

cotton fiber and spinning research work at Clemson and at College Station, Texas. For five years he was engaged in cotton utilization research work with the department. A graduate of Clemson, he has been with A.C.M.I. since 1941. He helped organize the Fiber Society and served as its secretary for 17 years. . . . Heard, vice-president in charge of research for West Point Mfg. Co., West Point, Ga., received his training at Georgia Tech and Texas Tech, where he also served as professor and later dean of the textile engineering department. He began his career in the industry at Lanett Bleachery and Dye Works, Lanett, Ala. Prior to joining West Point, he spent several years as dean of the Philadelphia Textile Institute. Appointment of advisers from research and industry is part of U.S.D.A.'s program to bring about closer co-operation between the department and industry.

Dr. William McGehee, director of personnel research at Fieldcrest Mills, Leaksville, N. C., has been named president-elect of the Division of Industrial Psychology of the American Psychological Association. He will serve a one-year term beginning September 1, 1962. Dr. McGehee, formerly head of the department of psychology at North Carolina State College, has been with Fieldcrest since 1947.

Robert E. Wilson has been named a field representative for James Talcott Southern Inc., Atlanta, Ga., a wholly-owned subsidiary of James Talcott Inc., New York City. Wilson, a C.I.T. Financial Corp. field representative since 1939, will represent Talcott in time sales and leasing services to Southeastern dealers and manufacturers of income-producing machinery and equipment. Prior to joining C.I.T., Wilson was with the B. F. Goodrich Tire Co. and the John Hancock Mutual Life Insurance Co., both in Charlotte, N. C.

James H. Sawyer has been named technical superintendent at Deering Milliken's Gayley Mill Corp., Marietta, S. C. A graduate of the University of New Hampshire, he has been with Deering Milliken since 1952. Prior to his promotion he was development manager at Gayley.

H. R. Hoke has been named plant manager of Aragon Mills, Aragon, Ga., a division of U.M.&M., succeeding C. T. Reed who has been transferred to the Greenville, S. C., office of the firm's fabric production division. A graduate of Clemson College and a native of Newton, N. C., Hoke has been with United Merchants for ten years, serving as superintendent of the Aragon plant the past two years. Succeeding him as superintendent is Crawford Asbell, transferred from Seminole Mills, Clearwater, S. C.

Siegler

E. W. Siegler has been named vice-president and general manager for Abney Mills, Greenwood, S. C. For the past six years Siegler has held a similar post with Erwin Mills, Durham, N. C., an Abney subsidiary. Prior to that he had held the same office at Greenwood. He will continue as a member of the board of Erwin.

John Larkin, overseer of winding and twisting at the Thomasville, Ga., plant of Coats & Clark Inc., retired September 1 after 38 years with the company. A native of England, he and his family came to the U. S. in 1923. His first job with the company came that year with The Clark Thread Co., East Newark, N. J. He transferred to Thomasville in 1947.

Samuel Boddie, formerly with Sayles-Biltmore Bleacheries, Asheville, N. C., has been named superintendent of the finishing and put-up department of The Kendall Co.'s Bethune, S. C., finishing plant.

James S. Love Jr. has been named a vice-president of Burlington Industries, in charge of public relations and advertising. Jack Hanson will continue as advertising director, with offices in New York. W. L. Beerman Jr., continues in charge of Southern public relations activities, with headquarters in Greensboro, N. C. Love has been associated with Burlington in various executive sales and merchandising capacities since 1955. He was formerly president of Burlington Ribbon Mills and of Sidney Blumenthal & Co. Inc., both Burlington subsidiaries.

Cahill

Thomas F. Cahill Jr. has joined Bibb Mfg. Co., Macon, Ga., as assistant director of research and development. In this capacity, he will assist L. R. Brumby, vice-president, in the administrative work of the department, as well as devoting a portion of his time finding markets for new Bibb products. Since 1950 he has been with the Du Pont Co., holding various positions in both manufacturing and research. He served as a technical service representative from 1956 until 1961 when he was made a marketing representative. He will make his headquarters in Macon.

Royston Dunford has retired as director of development and public relations of Courtaulds (Alabama) Inc. His retirement, for reasons of health, marks the end of 37 years service with the Courtaulds organization although he will continue to serve the company as a marketing adviser to the president. He joined the company in Coventry, England, in 1924 and came to the U. S. in 1946. He played an important part in the re-establishment of the Courtaulds organization in this country, and in the initial planning and building of the firm's new rayon plant in Mobile, Ala.

Lux

Rudolph Lux has been named product manager of cotton machinery at Whitin Machine Works, succeeding J. L. Orr who recently resigned. Lux has been with Whitin since 1952 in various sales assignments, most recently as manager of mill surveys and cost/price analysis. Before joining Whitin, he had been general superintendent at Monument Mills, Housatonic, Mass. . . . Succeeding Lux as manager, mill surveys, is Jesse J. Loredo who has been with the company for 15 years, serving since 1948 in the firm's export sales division, now known as Whitin International Ltd. A

native of San Luis Potosi, Mexico, Loredo was educated in Mexico City and obtained his degree in Cotton Textile Engineering at the Escuela Superior de Ingenieria Textil. After coming to this country, he took extension courses at Columbia University and at Lowell Technological Institute earning his B.T.E. degree in woolen and worsted manufacturing.

W. Beatty Armstrong, formerly of Ranlo, N. C., has been named superintendent of Gem Yarn Mills, Cornelius, N. C.

Monica Broner, New York-based stylist of the Neisler Mills Division of Massachusetts Mohair Plush Co., is currently touring Europe doing research in styles and trends of decorative fabrics. She will be in Europe for five weeks and will visit Germany, Switzerland, France, Italy and England. Neisler Mills, in Kings Mountain, N. C., is a major manufacturer of decorative and industrial fabrics.

Carruthers

Geo. Alan Carruthers, formerly with Canadian Industries Ltd., Millhaven, Ontario, has joined Turbo Machine Co., Lansdale, Pa., in its research and development division. At Canadian Industries since 1954, Carruthers was project engineer, responsible for mechanical design in the textile fibers division. Prior to 1954, he had been with Imperial Chemical Industries Ltd., Great Britain, as a technical officer in engineering research and plant engineering. He is an engineering graduate of London University.

Eric B. Norman has been promoted to the newly-created post of general sales manager at H. W. Butterworth & Sons Co., Bethayres, Pa. Norman joined the company in May as a sales representative for the Midwest, Far West, Canada and New York State.

McConnell

Burke M. McConnell has been named vice-president in charge of man-made fibers purchasing for Burlington Industries of Greensboro, N. C. McConnell has been a merchandising executive in Burlington's greige sales division for the past four years, and has been with Burlington more than 20 years. From 1954 to 1956 he was executive vice-president of Amerotron Corp., a division of Textron Inc. In his new post he succeeds C. L. Stafford Jr., who is now devoting full time to his duties as area director for Burlington Tricot Fabrics Co. and Cheraw Weaving Mill, divisions of Burlington Industries.

John T. Coleman has been named manager of sales services for the fiber marketing department of Allied Chemical's National Aniline Division. He will be responsible for co-ordinating the sales and production activities of Allied's two nylon fiber producing plants located at Chesterfield, Va. and Irmo, S. C. He previously had specialized in the co-ordination of sales and production for the acetate division of American Viscose Corp. until joining Allied Chemical.

C. E. (Chad) Davis has been named a Southern sales representative for Whitinsville Spinning Ring Co., Whitinsville, Mass. Davis will cover Georgia, Alabama, Tennessee and part of South Carolina. Formerly with Crown Cotton Mills, Dalton,

Davis

Williams

Ga., he will make his headquarters in Dalton. . . . Lanier Williams, who has been representing the firm in the above territory, has been reassigned to cover North Carolina, South Carolina and Virginia from headquarters in Charlotte.

William F. Lowell Jr. has resigned as vice-president of the international division of Saco-Lowell Shops after 15 years with the company. The resignation was effective September 18 and Lowell has since joined the newly-created Ten Pin Division of the Bowlmor Corp., Littleton, Mass. Bowlmor previously has been a manufacturer of small pins only.

Bussey

William W. Bussey, for several years associated with the textile chemicals industry, is now actively engaged in servicing textile plants in the Georgia area for Arnold, Hoffman & Co. Inc. Bussey was formerly with the dyestuff and chemical division of General Aniline & Film Corp.

Stephen W. Gifford Jr. of Dedham, Mass., has joined the wool and worsted machinery sales department of Whitin Machine Works. Gifford previously has been with the National Wool Marketing Corp. of Boston, wool merchants; the Wanskuck Co. in Providence, R. I.; and the Nichols Co. of Boston.

Celanese Fibers Co. has announced the promotion of three of its marketing executives. Dr. Reiner G. Stoll is now assistant director of marketing—plans and programs. He will be responsible for developing product marketing plans for both current and future Celanese fibers. Dr. Stoll will have his headquarters in New York and also will maintain an office in Charlotte. He had been director of the fibers applications and product development laboratories in Charlotte since 1955. . . . Dr. Robert D. Williams succeeds to Dr. Stoll's vacated post. Previously he has been manager of product development at the laboratories. . . . Fred Fortess has been appointed as-

sistant director of the laboratories. He had been manager of dyeing and finishing at Charlotte since 1956.


Suter

Charles A. Suter has been elected president of Geigy Chemical Corp., Ardsley, N. Y., succeeding William F. Zipse, president of the firm since 1943. Marking his 58th year of service with Geigy, Zipse now becomes chairman of the executive committee. Suter had completed ten years with J. R. Geigy, S.A. in Switzerland prior to joining the U. S. company. Rising to vice-president and director in 1943, he has been executive vice-president since 1950.

A series of management changes in the sales organization of Sonoco Products Co., Hartsville, S. C., has been announced. L. H. Stokes was named to the newly created position of general field sales manager. He joined the company in 1925 and in 1941 was promoted to Southern sales manager. At the present time he is serving as chairman of the Southeastern Boxboard Manufacturers and a member of the board of directors of the National Paperboard Association. . . . C. H. Campbell Jr. was named as assistant general field sales manager. He became resident sales manager of the company's Atlanta plant in 1958. . . . Robert Blackwell was promoted to divisional sales manager and will continue to assist Stokes in the sale of paperboard and cores. . . . J. A. Gainey, who was transferred from Sonoco's California plant to Atlanta in 1960, was elected to succeed Campbell as assistant resident sales manager.

E. Leland Jordan has been named executive vice-president of Utex Inc., sales division of the U. S. Textile Machine Co., Scranton, Pa. Prior to joining Utex, Jordan had been associated with United Merchants & Manufacturers for 21 years. Before that he was with Burlington Mills in various production capacities.


Stafford

John R. Stafford has been named to head Turbo Machine Co.'s new Southern sales and service office at 2501 Danbury Street, Charlotte, N. C. Stafford joined Turbo as a sales engineer in 1955. Prior to that he had been with Textile Machine Works, Reading, Pa., and Synthane Corp., Oaks, Pa.

Ralph L. Parker has been named division manager for the North Carolina-Virginia area for the textile division of Texize Chemicals, Greenville, S. C. Parker has been sales representative for Texize in the same area since 1956. Prior to that he was with Steel Heddle Mfg. Co., and with the School of Textiles, North Carolina State College. He will continue to make his headquarters in Greensboro. . . . Succeeding him as sales and service representative in the area will be Coyt C. Brown who for the past 11 years has been connected with Roanoke Mills, Roanoke Rapids, N. C. He is a graduate of the North Carolina State College School of Textiles. . . . John C. Gallman has also been named to the company's sales and service staff. He will make his headquarters in Greenville and travel throughout the South.


Fulp

John R. Fulp Jr., vice-president and secretary of Abney Mills, Greenwood, S. C., has been named a director of Erwin Mills, Durham, N. C. He is the grandson of the late John R. Abney, founder of Abney Mills, and is the nephew of the late John S. Abney who served on the Erwin board and as president of Abney until his death last May. Fulp makes his home in Anderson, S. C.

George I. Rounds has been named director of field operations for Tyrex Inc., the trade association of Tyrex rayon tire cord producers. Rounds, who will be located in the association's Akron, Ohio, office, will supervise the association's national staff of field representatives. He was formerly vice-president in charge of marketing at Industrial Rayon Corp.


Abelson

Richard D. Abelson has been named vice-president for manufacturing of the textile machinery division of Saco-Lowell Shops, a subsidiary of Maremont Corp. Abelson, who will be headquartered in Easley, S. C., has been with Maremont and its various subsidiaries since 1946. He is a graduate of Purdue University with a B.S. in mechanical engineering.

Carroll C. Parker has been named to the newly created position of sales manager for Curtis & Marble Machine Co., Worcester, Mass. Parker, who joined Curtis & Marble last January, had previously been with the U. S. Rubber Co. for 20 years in development, production, sales engineering and as a commodity sales manager in Passaic, N. J., and Fort Wayne, Ind. Later he was vice-president, sales, for Acme Abrasive Co. in Detroit. He is a graduate of the College of Technology, University of Maine and served in World War II as commanding officer of a glider squadron in the United States Air Force.

Frank H. Kaufmann, vice-president and general plant manager of Steel Heddle Mfg. Co., Philadelphia, Pa., has been elected president of the Alumni Association of The Philadelphia College of Textiles and Science.

W. R. Becker has been named district manager of the Charlotte, N. C., office of The Louis Allis Co., Milwaukee, Wisc., manufacturer of electric motors and adjustable speed drives. Becker was formerly manager of textile industry sales at the home office.


Cone

Sydney M. Cone Jr., a vice-president of Cone Mills Corp., Greensboro, N. C., has been named president of Olympic Chemical Corp., a Cone subsidiary organized last year to produce polyurethane foam. . . . George Nance, formerly director of engineering for Cone Mills, has been named general manager of the subsidiary.

Arthur R. Thompson of Charlotte, N. C., recently retired from Ciba Co. Inc., has been awarded the Harold C. Chapin Award. The presentation was made at the national convention of the American Association of Textile Chemists & Colorists at the Statler-Hilton Hotel, Buffalo, N. Y., at the Awards Luncheon on September 28th. The award is presented to a senior member, with membership of 20 years or more in the A.A.T.C.C., who has contributed to the attainment of the objects for which the association was founded. Thompson is the third recipient of the award. In 1960, it was made to Leonard S. Little, and the year before to Dr. Harold C. Chapin in whose honor it was established. Thompson has been active in A.A.T.C.C. since its founding in 1921. Too young to become a charter member, he was associated with Dr. Louis A. Olney, A.A.T.C.C. founder, while a student at the Lowell Technological Institute. He was active in organizing the Piedmont Section and held office as counselor, chairman, secretary and custodian. He served as vice-president of A.A.T.C.C. from 1934-1936 and 1938-1940. In 1959, the council appointed him to the office of treasurer, a post he relinquished following his retirement from Ciba early this year.

OBITUARIES

Robert M. Aude, 47, president of Heyden Chemical Division of Heyden Newport Chemical Corp., died August 20 at his home in Upper Saddle River, N. J. He had been with Hayden eight years, serving as its president since May 1960. Prior to joining Heyden, he had been with Monsanto Chemical Co. Surviving are his parents, his widow and four children.

John Christison, 48, a partner in Rossville Yarn Processing Co., Rossville, Ga., died August 26 following a heart attack. Prior to forming Rossville Yarn last February he had been manager of the worsted division of Peerless Woolen Mills in Rossville. He is survived by his widow, his mother, two daughters and three sons.

John L. Crist, 71, founder of Southern Dyestuff Corp., Mount Holly, N. C., died September 11 in Asheville, N. C. Prior to establishing Southern Dyestuff in 1936, Mr. Crist had been Southern sales manager of the Calco Division of American Cyanamid Co. with headquarters in Charlotte. He served as president of Southern Dyestuff until 1952, and as board chairman until his retirement last November. Southern became a division of American-Marietta Co. in 1958. Survivors include his widow and a son, John L. Jr., assistant to the president of Southern Dyestuff.

J. K. Hamilton, 49, secretary of Crown Cotton Mills, Dalton, Ga., died August 16 in Dalton. A graduate of Georgia Tech, he had been associated with Crown throughout his business career. In addition to being secretary of the firm, he was also superintendent of its industrial fabrics division. Surviving are his widow and two sons.

Thomas Smith Inglesby, 85, former president of Carolina Supply Co., Greenville, S. C., died August 29 in Greenville. He was one of three men who founded Carolina Supply in 1899, and he remained active with the firm until his retirement in 1946. His widow, a daughter and a son survive.

Harvey G. Pontz, 79, former manager of 14 of Burlington Mills' Southern plants, died August 27 in Waltham, Mass. In addition to his post with Burlington, Mr. Pontz had been founder and former owner of Pontz & Pontz Silk Co., Allentown, Pa.; superintendent of Newmarket Mfg. Co., Lowell, Mass.; former head of Susquehanna Silk Mills in eastern Pennsylvania and the South; and superintendent of William Skinner & Sons, Holyoke, Mass. He is survived by his widow, two daughters and two sons.

Dr. Fred Taylor, 83, retired cotton technologist for the U. S. Department of Agriculture and later the Department of State, died August 18 at Anderson, S. C. A native of Lancashire, England, Dr. Taylor came to the U. S. as a young man, graduated from the New Bedford Textile Institute and taught there for six years before accepting a post in 1908 as professor of textiles at Clemson College. He joined the U.S.D.A. in 1912, and was for a short time with Firestone Tire & Rubber Co. before entering foreign service work with the Agriculture and State Departments. He retired to Clemson in 1948. Surviving are his widow, a son and a daughter.

Clifford B. Terry, 76, former sales representative for Foster Machine Co., died September 13 in Westfield, Mass. Mr. Terry retired from Foster last January after 40 years with the firm.

MILL NEWS

CONSTRUCTION. NEW EQUIPMENT. FINANCIAL REPORTS. CHARTERS. AWARDS. VILLAGE ACTIVITY. SALES AND PURCHASES

SPINDALE, N. C.—Stonecutter Mills Corp. reports a 61% drop in income for its fiscal year ended June 30. Income for the period totaled $406,715 as compared with $663,930 a year ago. No sales figures were given for either period.

LIBERTY, S. C.—Woodside Mills is planning a $1.5 million expansion and modernization program for its Liberty Plants 1 and 2 here. A major phase of the program will be the construction of a 50,000 square foot addition to permit installation of new, high speed looms.

OPP, ALA.—Opp Cotton Mills and Micolas Cotton Mills report a 2% increase in profits during the first half of this year as compared with a year ago. No sales or earnings figures were given for either period, but shipments of $5.7 million this year were down from $6.1 million a year ago. Orders on hand July 1 were 12% higher than on July 1, 1960.

GREENWOOD, S. C. — Greenwood Mills has purchased the following Saco-Lowell equipment for three of its plants. Mathews Mill will install 40 MagneDraft spinning changeovers to replace present spinning systems on 9,600 spindles. At the Greenwood Plant, 33 spinning frames will be converted to Duo-Roth systems with the installation of changeovers on 9,900 spindles. The Ninety Six Plant is installing 33 high production comber changeover parts.

SHELBY, N. C.—The five Dover mills in this area expect to complete by the first of the year expansion projects totaling $1 million. Plants involved include Dover Mill Co., Dover Yarn Mill, Dora Knitting Co., Esther Mill Corp. and Ora Mill Co. A 25,000 square foot addition to Dover Mill will provide 15,000 square feet of space for the installation of $220,000 worth of new machinery, and 10,000 square feet of storage. A 25,000 square foot addition to Esther will be used to expand carding, spinning and twisting operations. A 5,000 square foot addition is being made to Dora Knitting, and an 11,000 square foot addition to Dover Yarn. The mill group employs some 2,000 workers. Annual sales average $35 million.

NEW YORK, N. Y.—M. Lowenstein & Sons reports a 79.7% drop in net earnings for second quarter '61 and a 75.1% decline for the first half of this year. Total sales during the second quarter of $111.6 million were 4.8% below the $117.2 million for the corresponding period a year ago. Sales for the first half of $225.9 million were 6.6% below the $242 million for the first six months of last year.

SILER CITY, N. C.—Hadley-Peoples Mfg. Co. is expanding its facilities by some $550,000. Included is the construction of a new 20,350 square foot building to house a finishing plant, storage space and office facilities. A second building of 20,687 square feet will house a spinning plant.

GREENVILLE, N. C.—Fieldcrest Mills is planning a $200,000 expansion of its wool spinning plant here. Fieldcrest, with headquarters in Spray, N. C., acquired the plant a year ago, increasing employment since then from 130 to 250 persons. The new expansion will add another 75 to 100 employees.

GASTONIA, N. C. — Textiles-Incorporated reports a 7.7% decline in sales for the first nine months of its fiscal year. Sales for the period totaled $20.7 million as compared with $22.4 million for the same period last year. Net profits was down from $1.2 million a year ago to $975,151, a drop of 18.8%.

SALISBURY, N. C. — Employees at Cone Mills Corp.'s plant here have voted 310 to 234 to become affiliated with the Textile Workers Union of America. The union had been defeated in similar elections at the plant in 1956 and 1958.

LANCASTER, S. C.—Springs Cotton Mills is planning construction of a $7 million plant near its Grace Finishing Plant at Grace's Station. The new facility will contain some 175,000 square feet of space, and will employ some 250-300 people. Design and construction of the plant will be handled by the company's own engineering department. It will be the first complete mill built by Springs since 1912.

ANNISTON, ALA. — Adelaide Mills has purchased four Saco-Lowell roving frames for its plant here. The frames are 96-spindle capacity each, Model FS-2, producing a 13½x7 package.

YORK, S. C.—Budyed Yarns Inc. is curtailing its bleaching, dyeing and finishing of cotton yarns preliminary to selling its existing equipment and expanding with new machinery into both natural and synthetic yarns. The transition is expected to take about 60 days.

NEW YORK, N. Y.—J. P. Stevens & Co. reports that net sales for the three-month period ending July 29 were $126.6 million as compared with $124.5 million for the corresponding three months of last year. Net earnings during the period were 31.5% below a year ago despite the increase in sales. Stevens announced August 29 that it was joining Enjay Chemical Co., a division of Humble Oil & Refining Co., in the pur-

chase of the operating assets and facilities of the National Plastic Products Co. The move is a joint effort to accelerate commercial development of Polypropylene and other new synthetic fibers.

RANLO, N. C.—A. M. Smyre Mfg. Co. has purchased 80 new Saco-Lowell Magne-Draft spinning frames representing a total of 19,200 spindles. The frames will be installed in the company's No. 2 plant here replacing older machinery. Cost of the new equipment, including reworking the air-conditioning system and repairing the floor, will exceed $900,000.

GREENSBORO, N. C.—Cone Mills Corp. has purchased eight complete one-process Permo spinning systems for installation in its Proximity Plant here. The system consists of a three-roll breaker card, a seven-roll finisher card, side draw, scotch feed, tape condenser and spinning unit. According to the Louis P. Batson Co., which handled the sale, the installation is the first of its kind in this country.

NEW YORK, N. Y.—Reeves Brothers Inc. reports an 8% drop in sales for its fiscal year ended July 1. Total sales for the period were $65.9 million as compared with $71.7 million a year ago. Net profits dropped from $2.3 million last year to $234,857 this year. A portion of the substantial drop in earnings was attributed to heavy, non-recurring start-up costs and related research and development expenditures incidental to the company's diversification projects.

CLINTON, S. C. — Clinton-Lydia Cotton mills has announced preliminary plans for expanding and modernizing its No. 1 Plant here. The project will include the expansion of the weave room, the relocation and air-conditioning of carding and spinning rooms, an expansion of the cloth room and cloth room storage, and the relocation of slashing. On completion of the program, the mill will be fully air-conditioned and will house all manufacturing processes from opening to cloth storage.

WINNSBORO, S. C.—United States Rubber Co. has announced a $1.1 million expansion and modernization program for its cotton yarn facilities at Winnsboro Mills. The program, to be completed in about a year, is the third at Winnsboro during the last year, and brings the company's expenditures for modernization and expansion here to more than $3.5 million since the Summer of 1960. Earlier this year, the company announced it was starting construction of a new $1.5 million nylon tire fabric production unit. This project is scheduled to be completed by December. An expansion and modernization program of the plant's nylon and rayon cord twisting facilities was started last year at a cost of $500,000, and an additional $500,000 is being spent this year to complete the program. The latest expansion and modernization of the cotton yarn manufacturing facilities will be completed by next Summer. United States Rubber also operates textile plants in Burlington, Gastonia and Raeford, N. C.; Scottsville, Va.; Shelbyville, Tenn.; and Hogansville, Ga.

NEW YORK, N. Y.—Indian Head Mills has purchased majority stock in Joseph Bancroft & Sons Co., and will continue its operation under present management as a subsidiary of Indian Head. Bancroft, with headquarters in Philadelphia, is a textile finishing firm which also licenses fabric finishing and yarn treating processes to other firms. Its tradenames include Ban-Lon, Everglaze, Minicare and Ban-Care. Indian Head announced on August 25 an offer of $20 per share of Bancroft stock, conditional upon acceptance of the offer by holders of not less than 500,000 of the 883,024 common shares outstanding by September 7. Some 760,000 shares were tendered by the deadline. The acquisition is another move by Indian Head toward further diversification. The company operates 17 plants employing 7,000 people. Sales have increased from $11 million in 1954 to $82 million in 1960.

JOANNA, S. C.—Joanna Cotton Mills Co. has completed the $3 million modernization program it began late last year. The program included all production processes through spinning, plus refrigeration from opening through spooling. Completion of the program was planned to coincide with a two-day visit of Joanna Western Mills Co.'s board of directors early in October.

THOMASTON, GA.—Thomaston Mills reports a 6.2% drop in sales and a 5.4% drop in income for the fiscal year ended June 30. Net sales totaled $38.2 million as compared with $40.7 million a year earlier. Profits declined from $2.9 million to $2.7 million. The company spent a total of $2,146,723 on plant improvements during the year, and has announced plans for the construction of a 60,000 square foot addition to its bleachery division. The new facility, scheduled for completion within a year, will permit installation of additional finishing equipment, and also provide additional storage for finished goods.

CUERO, TEX.—Guadalupe Valley Cotton Mills here has been sold to Otto Goedecke who plans to continue its operation as before pending announcement of modernization plans. A producer of duck and osnaburgs, the plant has some 13,000 spindles, 279 looms and 340 employees. It was organized in 1900. For Goedecke it was the second mill acquisition in recent months. Mexia Textile Mills at Mexia, Tex., was the first, and has since been extensively modernized.

NEW BEDFORD, MASS.—Berkshire Hathaway Inc. reports a net loss of $412,254 on a 26% sales drop in its fiscal third quarter ended July 1. Sales for the period totaled $10.7 million as compared with $14.4 million a year ago. The net loss compares with a net profit of $1.2 million last year. For the nine-month period ending July 1, this year's sales of $36.3 million were 26% below last year's $49.2 million. Net income for the nine months was $395,685 this year as compared to $3.9 million last year. Despite the loss, a ten-cent dividend was paid September 1 "in view of the strong financial position of the company and the fact that for the fiscal year ended October 1, 1960, considerably exceeded dividends paid."

EASLEY, S. C.—Alice Mfg. Co. has announced plans for an extensive expansion and modernization program for its Alice Plant. According to Ellison S. McKissick Jr., president of the company, the program will include the construction of a 30,000 square-foot addition; the purchase of 1,000 Draper X-2 looms; 5,000 spindles of new spinning; and installation of a refrigerating system for the carding and spinning departments.

LAWNDALE, N. C.—Cleveland Mills has purchased eight Saco-Lowell spinning frames for its plant here. The frames are 264-spindles, four-inch gauge, SJ-3H models. In addition, the company has ordered one four-drum Saco-Lowell Fleissner Dryer.

WARE SHOALS, S. C. — Riegel Textile Corp. is liquidating its work glove division in order to concentrate on other product lines. Three plants are involved. The plant at Brundidge, Ala., is being offered for sale; the plant at Greenville, Ala., is being leased; and the plant at Conover, N. C., is being studied for possible adaptation to the production of other items in the company's product lines. The Boss Mfg. Co. of Kewanee, Ill., is leasing the Greenville plant, has purchased Riegel's glove inventory, and will fill all glove orders now on Riegel's book.

NEW YORK, N. Y.—Burlington Industries has extended its investments in European textile operations through an agreement with Cyril Lord Ltd. of England. Burlington has made a $2.8 million partly convertible loan to Lord, and the companies will exchange technical information and services, and jointly explore the United Kingdom and continental markets in connection with textile products of common interest. Lord is a diversified manufacturer and distributor of tufted carpets, woven goods and surgical products, with 17 plants located in the Leicestershire and Lancashire areas of England and in Northern Ireland. Burlington has similar joint ventures with firms in France, Germany, Mexico, Colombia, Canada and the Republic of South Africa.

Textile Industry Schedule

For additional data (reservation requirements, membership requirements, program details, etc.) on activities listed here, contact name(s) shown in parentheses.

Oct. 5-6 (Th-F)—Fall meeting, Textile Quality Control Association, Sedgefield Inn, Greensboro. (Sec.: Werner Pels, National Cotton Council, Ring Bldg., Room 502, 1200—18th St., N.W., Washington 6, D. C.)

Oct. 5-6 (Th-F)—Annual meeting, North Carolina Textile Manufacturers Association, Carolina Hotel, Pinehurst, N. C. (Sec.: T. N. Ingram, 1008 Wachovia Bank Bldg., Charlotte, N. C.)

Oct. 7 (Sa)—Fall meeting, Alabama Textile Operating Executives, Thach Auditorium, Auburn University, Auburn, Ala. (Exec. Sec.: Cleveland L. Adams, Auburn University)

Oct. 11-13 (W-F)—Fall meeting, The Fiber Society, U. S. Hotel Thayer, West Point, N. Y. (Sec.: Julian S. Jacobs, Box 405, Athens, Ga.)

Oct. 12-21 (Th-Sa)—North Carolina Trade Fair, Charlotte Coliseum and Merchandise Mart, Charlotte, N. C.

Oct. 14 (Sa)—Fall meeting, Georgia Textile Operating Executives, Hightower Bldg., Georgia Tech, Atlanta. (Sec.: Herman Dickert, School of Textiles, Ga. Tech).

Oct. 14 (Sa)—Fall meeting, South Carolina Division, Southern Textile Association, Clemson, S. C. (Chairman: E. L. Ramey, Inman Mills, Inman, S. C.)

Oct. 19-20 (Th-F)—First meeting, Southern Textile Research Conference, sponsored by Piedmont Section, A.A.T.C.C., William Hilton Inn, Hilton Head Island, S. C. (Chairman, Vernon C. Smith, Burlington Industries Inc., Box B-2, Greensboro, N. C.)

Oct. 21 (Sa)—Fall meeting, Northern North Carolina-Virginia Division, Southern Textile Association, Cooleemee, N. C. (Chairman: Herman Cone Jr., Cone Mills Corp., Greensboro, N. C.)

Oct. 28 (Sa)—Fall meeting, Eastern Carolina Division, Southern Textile Association, School of Textiles, N. C. State College. (Chairman: Gilbert C. Mays, Erwin Mills, Durham, N. C.)

Nov. 1-2 (W-Th)—Annual meeting, Textile Engineering Division, American Society of Mechanical Engineers, Massachusetts Institute of Technology, Cambridge, Mass. (Chairman: Prof. Elliot B. Grover, School of Textiles, North Carolina State College, Raleigh.)

Nov. 8-9 (W-Th)—Chemical Finishing Conference, sponsored by the National Cotton Council, Sheraton Park Hotel, Washington, D. C. (National Cotton Council, Ring Bldg., Room 502, 1200-18th St., N.W., Washington 6, D. C.)

Nov. 9—(Th)—Fall meeting, Piedmont Division, Southern Textile Association, Johnston Memorial Y.M.C.A., Charlotte. (Chairman, J. W. Inscoe, Carolina Mills Inc., Maiden, N. C.)

1962

Jan. 6 (Sa)—Winter meeting, Board of Governors, Southern Textile Association, City Club, Charlotte, N. C. (S.T.A., P. O. Box 1225, Charlotte 1, N. C.)

Jan. 11-12 (Th-F)—13th annual Cotton Research Clinic, The Carolina Hotel, Pinehurst, N. C. (National Cotton Council, Ring Bldg., Room 502, 1200-18th St., N.W., Washington 6, D. C.)

Feb, 15-16 (Th-F)—Annual conference, Textile and Needle Trades Division, American Society for Quality Control, Clemson House, Clemson, S. C. (General Chairman: W. S. McMann, Dan River Mills, Danville, Va.)

Mar. 29-31 (Th-Sa)—Annual meeting, American Cotton Manufacturers Institute, Palm Beach Biltmore Hotel, Palm Beach, Fla. (A.C.M.I., 1501 Johnston Bldg., Charlotte 2, N. C.)

April 11-13 (W-Th)—Spring meeting, Textile Engineering Division, American Society of Mechanical Engineers, together with **The Fiber Society, Raleigh, N. C.** (Chairman: Elliot B. Grover, School of Textiles, North Carolina State College, Raleigh.)

May 2-5 (Tu-F)—Annual outing, Carolina Yarn Association, Pinehurst, N. C. (Exec. Sec.: Frank P. Barrie, P. O. Box 11411, Charlotte, N. C.)

(M) Monday; (Tu) Tuesday; (W) Wednesday; (Th) Thursday; (F) Friday; (Sa) Saturday; (Su) Sunday

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textile bulletin

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Summer Recovery Lagged; But Upturn Seems Near

DESPITE widespread and often drastic adjustments of textile prices and production over the past year, recovery lagged during the first half of 1961 and further curtailment of mill operations continued during the Summer months. Based on previous experience in cyclical behavior, this should mark the final phase of the downturn since market prices, which have been dragging bottom for the past four months, are now beginning to respond to the improved balance in supply and demand relationships.

Aggravating the 1960-61 recession and prolonging its duration has been the record breaking avalanche of foreign made imports. Imports of cotton manufactures, in total, have risen astronomically to an estimate of more than a billion square yards in 1960, of which the major part was 848 million square yards of broad woven fabric in the various forms of piece goods, fabricated textiles and apparel. The latter figure compares with 612 million square yards in 1959 and 389 million in 1958.

In 1960, and for the first time in its 30-year history, our record of "Countable Cotton Cloths" shows import yardage in excess of exports, due to successive gains of 70% in 1959 and 90% last year while exports declined by 6% in 1959 and 7.5% in 1960. Over a period of the last ten years, this loss in cotton piece goods alone comes to a total of 775 million square yards annually by combining import gains and export losses since 1951.

Although for the first six months of the current year there has been a substantial reduction in import yardage of cotton piece goods contrasted with the peak experience of 1960, the total is still 46% greater than in the like 1959 period. This sharp decline must be considered as the fruit of the recession period which simultaneously enforced overall curtailment of activity of domestic mills approximately 10%.

Plant Modernization Extensive

Under these adverse developments in the area of international trade, it is significant that expenditures for modernization of textile plants and equipment in 1960 reached their highest level since 1951. This is reflected in the estimates of new spindleage installed in the mills plus rebuilt equipment separately reported for the first time. The ten-year total is 4,378,671 or approximately 22% of spindles in place at the beginning of 1961. Impetus to the modernization programs undoubtedly stemmed from the relatively favorable earnings of 1959 and early 1960 joined with industry-wide realization that exceptional competitive situations demand the maximum of plant efficiency.

Contrasted with this surge of machinery modernization has been the liquidation of over 3 million spindles during the current decade. For installed spindleage in the cotton system mills, the current figure as of July 1, 1961, is 19.7 million, approximately half of the all-time peak number reported for 1925. In compensation, the annual hours run per average active spindle have increased from 2,898 in 1925 to 6,255 in 1960. Next to the 1959 performance this is a maximum figure which also highlights the smallest number of idle spindles since the pressures of World War II. *(Abstracted from W. Raymond Bell's final report as president of the Association of Cotton Textile Merchants of New York. Mr. Bell retired September 1 after 29 years with the association.)*

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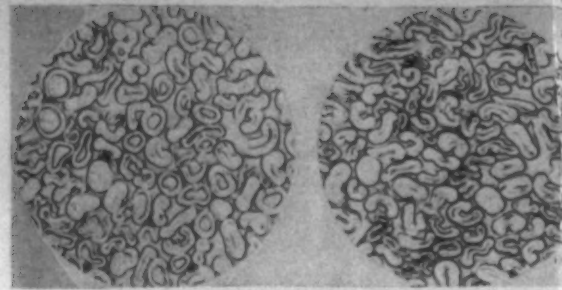

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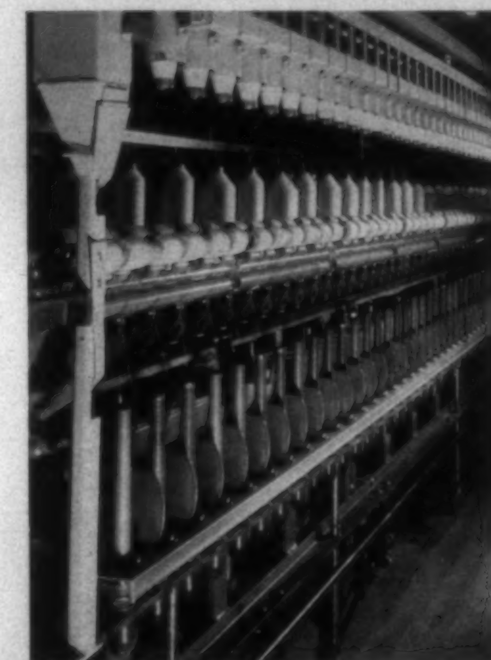

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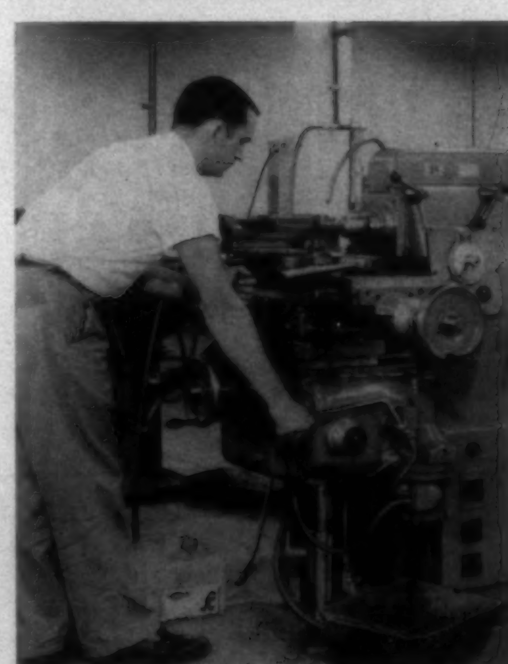

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